THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 23 NEW YORK, SEPTEMBER, 1925 No. 9

Syracuse the Foundrymen's Convention City

The 1925 Convention of the American Foundrymen's Association to be Held Jointly with the Institute of Metals Division in Syracuse, N. Y., October 5-9, 1925

Written for the Metal Industry by A. F. SAUNDERS, Syracuse, N. Y.

The foundrymen could not have chosen a more convenient or interesting place to hold their convention than Syracuse, N. Y. It is the most centrally located city in New York State and is within 300 miles of one third of the population of the United States. It lies in the center of an extensive and rich farming and industrial section, having a trading population in its exclusive trade radius of about 38 miles, in which reside over 350,000 persons. The city itself has a population of 200,000 and it covers an area of 20 square miles.

For many years Syracuse was known as the "Salt City," having been for over seventy years the scene of the largest production of commercially manufactured salt on the American continent. By 1862 peak production was reached with a total yearly output of over nine million bushels. From then on, owing to the discovery of salt deposits elsewhere, which broke the monopoly, the industry gradually declined. In 1908 the State, after a little more than a century of proprietorship, sold all its remaining interests in the salt springs. Many of the city's largest manufacturing plants now occupy the former salt lands bordering Onondaga Lake.

From the little village in 1825, Syracuse has grown into one of the most important manufacturing centers of the country. It is a leading city in the manufacture of tool steel, automobile gears, differentials and transmissions, typewriters, electrical hardware, electrical washing machines and ironers, steam clothes pressing machines,

MANUFACTURERS' AND LIBERAL ARTS BUILDING, STATE FAIR GROUNDS, SYRACUSE, N. Y.

cash carrying and conveying equipment, agricultural implements, high grade china dinnerware, fine wax candles, high grade shoes, automobiles, silver plated ware, foundry and machine shop products, boilers and radiators, automobile tires, etc.

It is the home of 750 diversified manufacturing establishments, employing 35,000 workers. Situated as it is on the main lines of the New York Central System, the West Shore, Auburn, Ontario and St. Lawrence Divisions, also the Syracuse Division of the D. L. & W. with a large and modern equipped harbor on the New York State Barge Canal, Syracuse enjoys an ideal situation for purposes of manufacture and distribution.

Syracuse University including the New York State College of Forestry, with a faculty of 350 and 6,500 students, is beautifully situated on a high hill in the Eastern section of the City; its many splendid buildings housing ten colleges and six schools, stands where all may see, on the broad campus overlooking Greater Syracuse. The Stadium is one of the finest, and is the scene of many Intercollegiate gridiron battles and track meets each year.

The New York State Fair Grounds where the Foundrymen's Convention will be held, is conceded to be one of the finest in the country. When the various improvements and additions planned are finished, it will make Syracuse the home of the greatest annual fair in the United States. Through the courtesy of the New York State Fair Commission, the A. F. A. has been tendered the use of the Manufacturers and Liberal Arts Building, providing over 100,000 net square feet of exhibit space.

Statistics on metal foundry and machine shop products for Syracuse show that this city ranks third in the State of New York in the production and use of such foundry products. There are located in the City of Syracuse and its immediate vicinity, over 35 establishments engaged in the metal founding, smelting, refining and manufacturing. Among the largest and most important of these firms are as follows:

FOUNDRIES

Caldwell & Ward Brass Company, 103 Decker Street. Brass, bronze, silver and aluminum castings.

E. R. Caldwell & Son Brass Company, 619 N. Fayette street. Oil and gas burners, carburetors, brass, bronze and metal castings.

Oberdorfer Brass Company, Thompson Road, East Syracuse. Brass, bronze and aluminum founders.

Onondaga Brass Company, 103 Decker Street. Brass castings.

Hayes Brass Foundry Company, 1628 North Salina Street. Brass foundry products.

Salina Brass Foundry, 123 Richmond Street. Brass castings.

J. & W. Senk, 1515 Lodi Street. Brass castings.

Standard Brass & Aluminum Foundry Company, 1301 Center Street. Brass and aluminum castings.

Smith & Caffrey, 2611 Lodi Street. Brass and bronze Foundry products.

O. M. Edwards Company, Solar & Plum Streets. Railroad car hardware and devices.

F. A. Austin Pattern Company, 301 Wallace Street. Bronze, aluminum, white metal patterns.

DIE CASTING

Franklin Die Casting Corporation, 203 So. Geddes Street. Die castings.

Precision Die Casting Company, Fayetteville, N. Y. Die castings.

CAST AND SHEET METAL WORK

King Brothers, 439 W. Fayette Street. Pumps, propellers, metal weather strips.

Crouse Hinds Company, Wolf & Seventh North streets. Electrical appliances, condulets, flood lights, projectors, cabinets, knife and radial switches, traffic control systems.

Pass & Seymour, Inc., Solvay, N. Y. Electrical wiring devices.

Lamson Company, Eastwood, N. Y. Conveyor, gravity cable and tube systems.

Benedict Manufacturing Company, East Syracuse, N. Y. Silver plated holloware and art metal goods.

Syracuse Ornamental Company, 581 S. Clinton Street. Ornamental furniture and casket Hardware.

B. G. & H. Metal Manufacturing Company, 100 Catherine Street. Metal picture frames, electric lighting fixtures.

Syracuse Metal Specialties Company, 218 W. Onondaga street. Sheet metal, stamping, metal specialties.

Syracuse Wire Works, 101 University Avenue, Ornmental brass railings and wire work.

Syracuse Stamping Company, 422 S. West Street. Sheet metal stampings.

WASHING MACHINES

Syracuse Washing Machine Corporation, Solar & Spencer Streets. "Easy" clothes washers and ironers.

Walker Dish Washer Corporation, 225 Walton Street. Dish washing machines.

DAIRY BUILDING AND COLONNADE, STATE FAIR GROUNDS, SYRACUSE, N. Y.

LANTERNS

R. E. Dietz Company, 221 Wilkinson Street. Metal lanterns of all kinds.

TYPEWRITERS

L. C. Smith & Brothers, 701 E. Washington Street. Typewriters.
Smith-Premier Company, 111 Dickerson Street. Typewriters.
Remington Typewriter Company, 114 Gifford Street. Typewriters.

HARDWARE

E. C. Stearns, 100 Oneida Street. Hardware, lawn mowers.
J. R. Clancy, 1010 W. Belden Avenue. Theatrical hardware.
S. Cheney & Sons, Manlius, N. Y. Hardware, castings, etc.

METAL CLEANING MATERIALS

Solvay Process Company, Solvay, N. Y. Alkali, soda ash, caustic soda, etc.

METAL REFINING

Empire Metal Company, 820 E. Water Street, Metallic alloys, babbitt metal, solder, phosphorized tin, silver.

The Caldwell & Ward Brass Company and the Onondaga Brass Company, a subsidiary foundry, specialize in high grade brass, bronze and aluminum castings of every description. They have a thoroughly modern plant located near the center of the City.

SLUSH CASTING ROOM, BENEDICT MANUFACTURING COMPANY

The Oberdorfer Brass Company now occupies its new foundry building located about two miles East of the City line. This is one of the most completely equipped foundries in the East, supplying many thousands of aluminum and brass castings to the automobile trade, and employs over 300 men.

The Franklin Die Casting Corporation is one of the pioneer die casting establishments of the country. Its splendidly equipped plant supplies not only all of the die cast parts used in the locally made Franklin automobile, but supplies a general line of die castings to many other industries throughout the Eastern part of the country.

PLANT OF BENEDICT MANUFACTURING COMPANY

The Benedict Manufacturing Company of East Syracuse, a few miles east of the City is the only manufacturer of silver plated holloware and art metal wares in this vicinity. It has a very efficient slush casting department, turning out large quantities of clock cases, desk articles, candlesticks and various decorative trimmings used in the manufacture of silverware. "Benedict Period Plate" and "Indestructo" soda fountain and hotel silver are internationally used.

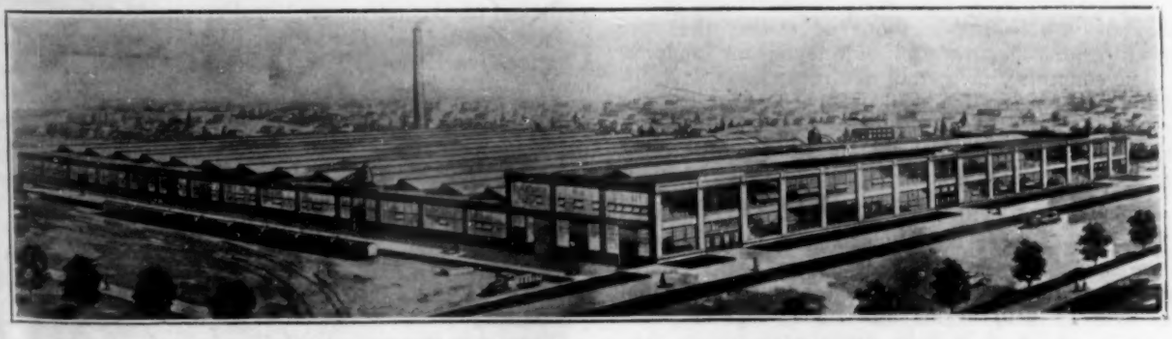
The Syracuse Washing Machine Corporation stands first on the list of local industries as the largest user of aluminum and brass castings. It is also one of the largest consumers of sheet copper in the country, the bodies of the washing machines being made of this material. This plant's average production is over 300 machines per day.

The Walker Dish Washer is another product that has brought fame to Syracuse. Large quantities of brass and aluminum castings enter into the making of these popular washers. Between one and two hundred machines are turned out each month.

The Crouse Hinds Company, one of the oldest and largest plants in the country manufacturing electrical appliances, is located in the north end of the City. Its buildings and equipment are the last word in modern design and efficiency. The company has recently established its own brass foundry. Over nine hundred men are employed in the entire plant and the annual value of its finished products exceeds $1,000,000.

Syracuse is also the home of the largest lantern works in the world, R. E. Dietz Company. This splendidly equipped plant employs five hundred men. Metal lanterns of every description are made here and shipped all over the world.

Located in the west end of the City is the huge plant of the Solvay Process Company, the largest manufacturers of alkali and caustic soda products in the country. Its buildings cover several miles of land. The base material, limestone, used in the manufacture of their products, is conveyed several miles across country from extensive



SYRACUSE WASHING MACHINE COMPANY

quarries owned by the company. Salt brine is also piped into the plant from Salt Springs located several miles South of the City. This company employs several thousand men.

Visiting Foundrymen will receive a cordial welcome and find many things of interest during their stay in the "Central City."

FOUNDRY DEPARTMENT, SYRACUSE UNIVERSITY

Members of the American Foundrymen's Association, the American Malleable Castings' Association and the Institute of Metal Division will receive identification certificates entitling them to reduced railroad rates.

JOINT MEETING WITH INSTITUTE OF METALS DIVISION

Three joint meetings are to be held with the Institute of Metal Division of the A. I. M. E. These are the joint opening meetings on brass foundry topics, a round table discussion on brass foundry problems at a luncheon gathering of brass foundry foremen, superintendents and others interested in shop problems and a regular session on aluminum-alloy topics. These meetings for the non-ferrous foundrymen are all scheduled for the first three days of the convention.

NEW DEVELOPMENTS IN SAND CONTROL

The report of the work of the foundry sand investigation committee will be of interest to all foundrymen, for new developments will be discussed. Since the Milwaukee meeting, many of the largest foundries of the country have undertaken sand control testing and the benefits to be derived from such work will be discussed from a practical standpoint. Two new committees of the sand research organization will have preliminary reports to make. These are the sub-committee on grading, and the sub-committee on core tests. The sub-committee on grading will discuss the possibility of establishing standard specifications for grading and buying sands. The need for such standards has been felt for a long time and the results the committee hope to accomplish should lead to the use of specifications in buying sands.

The sub-committee on core tests is investigating the possibility of establishing methods of testing the core sand mixtures, similar to tests developed for molding sands. The committee on foundry refractories is developing a discussion session where problems peculiar to each phase of the foundry practice will be given prominence. A pamphlet listing live refractory questions is to be distributed and solutions will be discussed at this meeting.

ROUND TABLE DISCUSSION ON BRASS FOUNDRY TOPICS

On Tuesday, October 6, a luncheon will be held for those interested in brass foundry shop problems. After the luncheon, an informal discussion on practical shop problems will be held. This meeting is especially for shop foremen and each will be given a chance to contribute to the discussions. No report of the discussions will be kept as it is desired to have all feel especially free to express their views.

APPRENTICE TRAINING

Apprentice training will again be taken up at an open meeting at which time methods of carrying on training in the smaller plants and unorganized groups will be explained. The committee desires to give the greatest publicity to apprentice training as it is felt that it is one of the greatest needs of the foundry industry at the present time.

TENTATIVE SCHEDULE—SESSIONS ON METALS

SESSION NO. 1, MONDAY, OCT. 5—2:00 P. M.

Joint Opening Meeting, American Foundrymen's Association and Institute of Metal Division, A.I.M.E.

The Advantages of Recuperation in Connection with High Temperature, by Col. H. D. Savage, Combustion Engineering Corporation, New York City.

Brass Foundry Problems, by F. L. Wolf, Ohio Brass Company, Mansfield, Ohio.

Some Refractory Problems in the Non-Ferrous Electric Furnace Casting Shop, by G. F. Hughes, Bridgeport Brass Company, Bridgeport, Conn.

Temperature Control of Non-Ferrous Alloys, by R. L. Binney, The Binney Brass and Bronze Company, Toledo, Ohio.

SESSION NO. 4, TUESDAY, OCT. 6—10:00 A. M.

Aluminum and Aluminum Alloys. Joint Meeting A.F.A. and Institute Metals Division A.I.M.E.

Aluminum Alloys for Air Craft, by S. Daniels, Engineering Division, Air Service, U. S. A., McCook Field, Dayton, Ohio.

Aluminum Alloys, by M. de Fluery, Paris, France. Exchange paper of the Association Technique de Fonderie de France.

Mechanical Properties of the Aluminum-Copper-Silicon Alloy as Sand Cast and as Heat Treated, by Samuel

FOUNDRY DEPARTMENT, SYRACUSE UNIVERSITY

Daniels and D. M. Waner, McCook Field, Dayton, Ohio.

Report of Committee on Non-Ferrous Metals.

Aluminum-Alloy Permanent Mold Castings, by J. B. Chaffee, Jr., Permold Co., Cleveland, Ohio.

SESSION NO. 5, TUESDAY, OCT. 6—12:15 P. M.

Luncheon, Round Table Discussion. Joint Meeting A.F.A. and Institute of Metals Division A.I.M.E.

Brass Foundry Topics, Informal Discussion.

SESSION NO. 6, TUESDAY, OCT. 6—3:00 P. M.

Apprentice Training Section.

Discussion of experiences of apprentice training.

SESSION NO. 7, TUESDAY, OCT. 6—3:00 P. M.

Foundry Refractories.

Discussion of questions of foundry refractories.

SESSION NO. 8, WEDNESDAY, OCT. 7—10:00 A. M.

The Present Status of the Investigation of Fatigue of Non-Ferrous Metals, by H. F. Moore, University of Illinois, Urbana, Ill.

The Annealing Cracking of Nickel Silver, by E. O. Jones and E. W. Whitehead, Manchester, England.

Business meeting of the Institute of Metals Division.

SESSION NO. 9, WEDNESDAY, OCT. 7—10:00 A. M.

General Papers and Committee Reports.

Report of Committee on Corrosion.

Report of Joint Committee on Pattern Standardization.

Safety in the Foundry, by R. G. Adair, Supervisor of Safety, The American Rolling Mills Company, Middletown, Ohio. Contributed on behalf of the Ohio State Foundrymen's Association.

Foundry Management, by Mr. Barrett, Metropolitan Life Insurance Co., New York.

METAL MEN DIRECTORS OF AMERICAN FOUNDRYMEN'S ASSOCIATION

L. W. OLSON
OHIO BRASS COMPANY
MANSFIELD, OHIO.

JESSE L. JONES
WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

WEDNESDAY, OCT. 7—1:00 P. M.

A Group Picture of Association Members and Guests Will be Taken.

SESSION NO. 10, WEDNESDAY, OCT. 7—1:30 P. M.

Business Session.

Address of President.

Report of Secretary-Treasurer.

Report of Resolutions Committee.

Report of Election of Officers.

SESSION NO. 11, WEDNESDAY, OCT. 7—2:30 P. M.

Sand Control in the Foundry.

Report of Chairman of Joint Committee on Molding Sand Research.

Report of Chairman of Sub-Committee on Testing Foundry Sand.

Report of Chairman of Sub-Committee on Grading Foundry Sand.

Report of Chairman of Sub-Committee on Conservation and Reclamation of Foundry Sands.

A Novel Method of Tempering Sand, by Max Sklovsky, Deere & Company, Moline, Illinois.

Some Examples of the Relation Between the Formation of Sand Deposits and Their Physical Character, by D. W. Trainer, Geology Department, Cornell University, Ithaca, N. Y.

Testing Apparatus, by T. S. Adams, Cornell University, Ithaca, N. Y.

SESSION NO. 14, THURSDAY, OCT. 8—2:00 P. M.

Sand Research.

Report of Sub-Committee on Geological Survey.

Practical Tests of Sand, by H. W. Dietert and W. M. Myler, U. S. Radiator Corp., Detroit, Mich.

Laboratory Testing of the Life of Sand, by C. R. Nevin, Cornell University, Ithaca, N. Y.

LIST OF EXHIBITORS

Adams Co., Dubuque, Iowa—141
Advance Milling Co., Chicago, Ill.—289
Air Reduction Sales Co., New York, N. Y.—234, 236
Ajax Metal Co., Philadelphia, Pa.—1, 2, 3
Albany Sand & Supply Co., Albany, N. Y.—206
Alloys & Products, Inc., New York, N. Y.—414, 416
American Brake Shoe & Foundry Co., Chicago, Ill.—284
American Engineering Co., Philadelphia, Pa.—12, 14, 16
American Foundry Equipment Co., New York, N. Y.—48-54, 133-137
American Metal Market Co., New York, N. Y.—374, 375
American Vent Wax Co., Lockport, N. Y.—102
Ames Shovel & Tool Co., Boston, Mass.—249
Arcade Manufacturing Co., Freeport, Ill.—237, 239, 241
Armstrong-Blum Manufacturing Co., Chicago, Ill.—4, 5
Asbury Graphite Mills, Asbury, N. J.—292
Atkins & Co., E. C., Indianapolis, Ind.—265
Austin Co., Cleveland, Ohio—179
Auto Truck Industrial Appliances, Inc., New York.
Ayers Mineral Co., Zanesville, Ohio—371

Bartlett & Snow Co., C. O., Cleveland, Ohio—185
Baumgardner Corp., H. L., Chicago, Ill.—340, 341
Beardsley & Piper Co., Chicago, Ill.—83-88
Besley & Co., Chas. H., Chicago, Ill.—244
Bethlehem Steel Co., Bethlehem, Pa.—397
Blystone Manufacturing Co., Cambridge Springs, Pa.—210
Bradley Washfountain Co., Milwaukee, Wis.—188
Brass World Publishing Co., New York, N. Y.—372
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.—8, 10
British Aluminum Co., New York, N. Y.—123

California White & Sugar Pine Manufacturers Association, San Francisco, Calif.—369
Campbell-Hausfeld Co., Harrison, Ohio—38
Carborundum Co., Niagara Falls, N. Y.—294, 295
Carter Bloxonend Flooring Co., Kansas City, Mo.—358
Chase, Frank D., Inc., Chicago, Ill.—185, 187
Chicago Crucible Co., Chicago, Ill.—359
Chicago Pneumatic Tool Co., New York, N. Y.—61, 63, 65
Chisholm Moore Manufacturing Co., Cleveland, Ohio—262
Clark Tructractor Co., Buchanan, Mich.—80, 82
Cleveland Pneumatic Tool Co., Cleveland, Ohio—212, 214
Clipper Belt Lacer Co., Grand Rapids, Mich.—103
Coale Lumber Co., Thos. E., Cranford, N. J.—424, 425
Coleman Co., F. A., Cleveland, Ohio—58, 60
Combined Supply & Equipment Co., Buffalo, N. Y.—56
Corn Products Refining Co., New York, N. Y.—288

Davenport Machine & Foundry Co., Davenport, Iowa—240, 242
Demmler & Bros., Wm., Kewanee, Ill.—243, 245
Detroit Electric Furnace Co., Detroit, Mich.—97, 99
Disston & Sons, Inc., Henry, Philadelphia, Pa.—192
Dixon Crucible Co., Joseph, Jersey City, N. J.—402
Dock & Mill Co., North Tonawanda, N. Y.—391

Electric Furnace Co., Salem, Ohio—121
Elwell Parker Electric Co., Cleveland, Ohio—13

CASTING ROOM, CALDWELL & WARD BRASS COMPANY

POURING METAL AT THE CALDWELL & WARD BRASS COMPANY

Transmission Ball Bearing Co., Buffalo, N. Y.—190
Truscon Steel Co., Youngstown, Ohio—255, 257, 259
Tutein, E. Arthur, Boston, Mass.—415, 417

United Compound Co., Buffalo, N. Y.—356
United States Graphite Co., Saginaw, Mich.—363, 364
United States Silica Co., Chicago, Ill.—114

Wadsworth Core Machine & Equipment Co., Akron, Ohio—354
Waldo, Egbert & McClain, Inc., Buffalo, N. Y.—355
Warner & Swase Co., Cleveland, Ohio—127, 129
Watson Engineering Co., New York, N. Y.—348
Westinghouse Traction Brake Co., Pittsburgh, Pa.—15, 17
Whitehead Bros. Co., Buffalo, N. Y.—418-421
Whiting Corporation, Harve, Ill.—181, 183
Williams Co., G. H.—Erie, Pa.—96
Woodison Co., E. J., Detroit, Mich.—150-154
Worthington Pump & Machinery Corp., Cincinnati, Ohio—35

Yale & Towne Manufacturing Co., Stamford, Conn.—31, 33
Young Bros. Co., Detroit, Mich.—216, 218

VARIOUS EXHIBITS

The exhibit of the Pangborn, Hagerstown, Md., will include a complete direct motor driven, clear vision tableroom, with dust arrester and exhauster overmounted on the room. Also, a new "Loads Quick" sand blast barrel, designed for quantity production, with integral direct motor drive for both barrel and elevator. Representatives in attendance will be: Thomas W. Pangborn, president; John C. Pangborn, vice-president; H. D. Gates, sales manager; P. J. Potter, works manager; Foster J. Hull, mechanical engineer; and district sales engineers, Geo. A. Cooley, Springfield, Mass.; Jesse J. Bowen, Rochester, N. Y.; W. T. Randall, Philadelphia; Charles T. Bird, Detroit; and W. C. Lytle, Chicago, Ill. The Company address will be at the Hotel Syracuse.

The exhibit of the Monarch Engineering & Manufacturing Company, Baltimore, Md., will consist of the following:

No. 92, simplex melting furnace, oil-gas, motor oscillating; No. 125, tilting crucible furnace, oil-gas; No. 45, stationary crucible furnace, oil-gas; No. 1,000, monometer furnace for die casting work or soft metals; dross reclaiming furnace; combination core oven, all fuels; blizzard sand sifter and motor; special railroad bearing lining furnace; ladle heater, oil-gas; positive blower, oil pump and motor; oil fired cupola for iron and scrap metal; motor blower, tilting furnace, coal or coke fired, no crucible, for brass, bronze, aluminum, scrap, etc.; iron pot stationary bottom pour furnace for match plate pattern work or soft metals. Representatives will be:

George C. Schimpf, general manager; H. D. Harvey, treasurer; J. V. Martin, F. P. Maujean, W. H. Raber and W. Chenowith.

The Bridgeport Brass Company is doing its part to foster the "brass tack" idea of getting down to fundamentals of national economy by distributing free for convention purposes a neat little brass tack pin, to those associations whose members use products similar to the brass goods made in the Bridgeport Brass Company's factory. To others, owing to the persistent demand for these attractive little emblems, a nominal charge to cover costs has been found necessary. Requests from readers of this paper will receive special consideration in the distribution of the brass tack pins.

Booths Nos. 25, 27, and 29 will be occupied by the **General Electric Company.** Exhibits by that company will include a foundry blower, portable arc welding equipment, a crane motor and a motor generator which will be in operation and which will furnish direct current for use of exhibitors. C. T. McLoughlin of the General Electric Company will be in charge of the exhibit.

DR. RICHARD MOLDENKE AND DR. ROBERT J. ANDERSON, TO RECEIVE FIRST SEAMAN AND McFADDEN MEDALS OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION

On the recommendation of the American Foundrymen's Association's Board of Awards, the Board of Directors has chosen Dr. Richard Moldenke to be the first recipient of the Joseph S. Seaman gold medal, one of the Association's four major awards, in recognition of his many contributions to the foundry industry. Dr. Robert J. Anderson was at the same time chosen to receive

DR. RICHARD A. MOLDENKE

R. J. ANDERSON

the first W. H. McFadden gold medal for his contributions to the technical sessions of the American Foundrymen's Association and his contributions to the aluminum casting industry. These medals, which are to be presented at the Syracuse meeting, are two of four gold medals authorized for presentation from time to time to outstanding men connected with the foundry industry. The first Penton and Whiting medals were presented at the 1924 Milwaukee meeting to Enrique Touceds and John Howe Hall for their contributions to the malleable and steel castings industries respectively.

These medal awards were made possible by gifts to the Association, contributed in 1920, by four charter members and past officers of the Association, John A. Penton, W. H. McFadden, J. H. Whiting, and the late Joseph S. Seaman.

Bright Annealing Brass

Q.—We are under the impression that we have seen advertised a preparation to prevent scaling on brass and bronze pieces during the annealing process. If you know of any such a preparation, or the makers of it, we would like that information.

A.—Outside of the laboratory where some successful experiments have been made in bright annealing, in an atmosphere of natural gas, and which have not yet reached a stage of practical application, we have no knowledge of any preparation that will prevent scaling of brass or bronze (i.e., oxidation), during the annealing process, at the high temperature necessary to do the work. Scaling can be prevented by annealing in a non-oxidizing atmosphere. This can be accomplished either by annealing in a sealed container, the pieces being covered with charcoal, or by the use of one of the different types of sealed furnaces. The makers of these furnaces guarantee a bright anneal.—W. J. Pettis.

The Oxy-Acetylene Welding of Copper

Experiments Showing that Copper Can Be Welded Without Oxidation

Written for The Metal Industry by CYRIL S. SMITH, Metallurgist

In spite of the fact that there is a very large amount of copper used at the present time, it is very noticeable that there is only very little welding of the metal being carried out. This is all the more remarkable since it is difficult to make really sound copper castings, and most copper articles are built up from rolled metal. The processes of silver-soldering, brazing and riveting are used, in spite of obvious defects. For joining wire of all gauges the electrical resistance method is very successful, but chemical and electrical engineers are in need of something more than this, and would find a reliable process for the autogenous welding of copper of great use, as the joint itself is of copper, and possesses the characteristic properties of that metal.

There is is no doubt that copper is more difficult to weld than is steel. The principal factors affecting the application of this method of joining are, firstly, the high thermal conductivity of copper, which is nearly seven times that of iron, and which leads to a large consumption of gases, and makes the heating of large pieces difficult; secondly, the fact that molten copper absorbs a large quantity of gas, which will be liberated on solidification, making the joint porous and weak; and, lastly, the intense local heating of the metal causes a zone of weakness in the solid copper immediately neighboring the molten metal, although this source of trouble can be removed by suitable treatment.

The first difficulty can be overcome by employing auxiliary heating to raise the parts being joined to a temperature of at least 700°C.; otherwise there is a chance that the filling metal will be merely cast between the cold walls, as in a chill mold. When employing external heating it is important to avoid as far as possible contact of reducing gases with the hot metal, or the metal will be embrittled and rendered useless.

The absorption of gases from the flame is a more difficult problem. Most of the literature on the subject stresses the fact that copper readily oxidizes when melted with the oxy-acetylene flame. The present author has, however, been unable to find any traces of oxide in copper melted with a carefully adjusted flame, unless the melting was performed with the extreme tip. This is exactly in accordance with theory, for the hottest part of the oxy-acetylene flame has a temperature of about 3,000°C, and at this temperature not only will the dissociation of water into its elements be complete, but the reaction $CO_2 = CO + O$ occurs to such an extent that carbon dioxide is also practically absent. This means that acetylene burns the hottest part of the flame to carbon monoxide. The hydrogen is liberated as such, and burns, together with the carbon monoxide, in the outer part of the flame, where they come in contact with atmospheric oxygen, and form a relatively cool insulating jacket. The reactions are:

$$(1)\quad C_2H_2 + O_2 = 2CO + H_2$$
$$(2)\quad 2CO + O_2 = 2CO_2$$
$$(3)\quad 2H_2 + O_2 = 2H_2O$$

For the complete combustion of 1 volume of acetylene 2½ volumes of oxygen are required. In practice a correctly adjusted blowpipe consumes from 1 to 1½ volumes of oxygen for 1 volume of acetylene—which corresponds with the first equation above. Just beyond the white cone in the flame, i.e., in the portion used for welding, there should be no free oxygen, but only the reducing gases, hydrogen and carbon monoxide. It is therefore quite possible to melt copper and make welds entirely free from oxide. It appears, therefore, that deoxidizing agents are unnecessary, although nearly all the feeding rods at present in use contain small amounts of phosphorus or other element to reduce the oxide supposedly formed during welding.

When copper is melted without any additions it absorbs carbon monoxide and other gases from the flame, and on solidification much of this will be liberated, with the formation of spongy metal. If small quantities of certain elements be added, perfectly sound cast metal can be obtained, and the chief function of special elements in the feeding rod is to produce sound filling metal. Phosphorus, the element usually present in welding sticks, is quite efficacious, but it considerably reduces the electrical conductivity, and makes the metal hot short. There are many other elements which can be used, but the author has found that a rod with 1% of silver, though rather expensive, gives excellent results, the metal being sound, of good mechanical properties, and of low resistivity. It is interesting to note that the Canzler patent rod, which has been used with success in Germany for the repair of copper locomotive fireboxes, contains silver in amounts up to 5.0%, in addition to phosphorus. Experiments by the author have shown that silver, in addition to its effect on gas solubility markedly affects the condition of the oxide which will be formed if oxidation accidentally occurs during melting. In the presence of small amounts of silver, which do not affect the quantity of oxygen absorbed, the eutectic structure is suppressed completely, and the oxide exists in the form of comparatively large isolated globules, which are no more harmful to the mechanical properties than the "oxidules" present in rolled copper. Figs. 1 and 2 show the structure of copper which has been melted by a coal-gas blowpie, with free access to air. The metal of Fig. 2 had a small amount of silver added, and the effect on both gas absorption and form of oxide will be noticed.

The effect of the heat of the flame on the solid metal in the immediate neighborhood of the weld is of great importance. Mechanical tests on a large number of welds which had been made between two pieces of commercial conductivity copper rod, showed the very poor qualities of the welds, and it was noticeable that the composition of the filling rod had little effect on the strength. Micro-

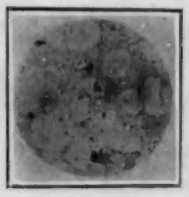


FIG. 1. COPPER MELTED WITH COAL-GAS BLOWPIPE. UNETCHED. X200

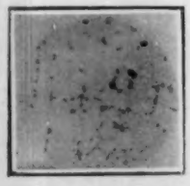


FIG. 2. COPPER WITH 3% SILVER, MELTED LIKE FIG. 1. UNETCHED. X200

FIG. 3. FRACTURE OF WELD, ETCHED ACID FERRIC CHLORIDE. X250

and macroscopic examinations showed that fracture was not occurring either through the filling metal, or through the junction between this and the unmelted metal, but in almost all cases the fracture passed through the unmelted, but strongly overheated metal about 0.5 mm. from the junction. This is well illustrated by Fig. 3, which shows

the actual fracture of a weld. The coarse grained filling metal is seen, with a thin layer of finer grained unmelted metal adhering to it. The brittle zone is shown in Fig. 4, and at a higher magnification in Fig. 5, and is seen to consist of streaks of oxide, apparently intergranular.

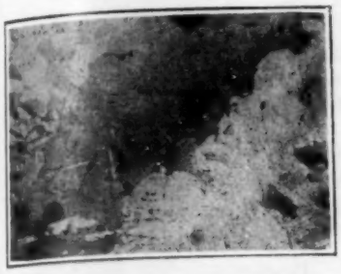


FIG. 4. BRITTLE ZONE IN OXY-ACETYLENE WELD. ETCHED ACID FERRIC CHLORIDE. X75

FIG. 5. BRITTLE ZONE IN WELD UNETCHED. X300

This is due to the metal having been heated above the eutectic melting point, but below the fusing point for the whole mass. Le Grix (Revue de la Soudure Autogene, i, 1922) deals with this regeneration of eutectic at some length, and considers that it is necessary to employ deoxidized copper for welding. The brittleness can, however, be removed by suitable thermal and mechanical treatment, which causes the oxide to reassume the globular form. This treatment will also break up the coarse cast structure of the filling metal, and makes it very nearly as ductile as rolled metal. Welds made with the 1% silver feeding rod mentioned above were annealed for one hour at 800° C. and subject to slight hammering, and gave the following results:

TENSILE TESTS ON WELDS IN ½" COPPER ROD

Particulars	Tensile Str. lbs. sq. in.	El. % in 2"	Fracture
Unwelded rod.....	32,480	46	
Untreated weld.....	22 400	13	Through brittle zone
Untreated weld.....	20,050	10	Through brittle zone
Hammered and annealed weld	31,360	32	Through weld metal
Hammered and annealed weld	32,370	40	½" away from weld

Welds made with filling rod containing 1% silver.

Welds made with electrolytic copper as filling material and subjected to the same treatment broke at 25,600 lbs. sq. in., with 19% elongation, fracture occurring through the weld metal, which was found to be porous.

It is possible that the brittle zone is due to the well-known gassing of copper, when it is heated in a reducing atmosphere to a high temperature. The microscope does not show any indication of this, and the author has shown in work recently carried out that the action of reducing gases is much less at temperatures near the melting point of copper than it is at about 850° C, where the maximum deterioration occurs. The author has also shown that, contrary to general opinion, it is possible to restore almost completely the properties of gassed copper by annealing and forging, preferably in a hydrogen atmosphere. Gassing may therefore play a part in welding, but the author is of the opinion that the brittle zone is due almost entirely to the regeneration of the oxide eutectic, which, owing to its peculiar distribution is very deleterious.

Another point of interest which arose during the tests was that welds made with the use of borax as a flux were definitely inferior to those made with no flux. The average of two closely agreeing tests on welds made with borax flux showed a tensile strength of 15,900 lbs. sq. in. with an elongation of 8.5%, while welds made without flux of any kind broke at 18,320 lbs. sq. in., with 10% elongation on 2 in. The weakening is probably connected with the fact that copper borate is relatively infusible. It was found that when borax was used, fracture occurred generally through the actual junction between melted and unmelted metal, and not in the normal manner through the brittle zone. The use of a compound flux would probably be satisfactory, but when welding clean copper the use of a flux of any kind is totally unnecessary.

It is interesting to note that the shape of the prepared faces of the rods before welding markedly affects the tensile strength of the untreated welds. This is due partly to the difficulty of obtaining proper and complete fusion of the whole face, unless it is readily accessible to the torch, and partly to the fact that with some shapes the brittle zone is placed in an unfavorable position in relation to the applied stress. The best results were obtained with rods cut away at an angle of 45°, thus:

Electrical resistivity determinations were made on all the welds, over a length of 9 cm., the weld being in the center. Welds made with phosphorus rods had an average specific resistance of 1.95 to 2.00 microhms per cubic cm. compared with 1.78 for the silver containing welds, and 1.73 for welds made with electrolytic copper, and for the unwelded rod, at 25°C.

In the consideration of the above results it must be remembered that the experiments were conducted on small rods, in which the high heat conductivity of copper is no great disadvantage. With large pieces of copper of heavy section the difficulties increase considerably, and it would be very difficult to apply the recommended treatment to large welds.

SUMMARY

It has been shown that the very poor qualities of oxy-acetylene welds in copper are due to a brittle zone in the unmelted but overheated metal immediately adjoining the zone of fusion. This can be removed, if the metal is not too high in oxygen, by suitable thermal and mechanical treatment, and only when this has been applied does the quality of the filling metal become of importance. Contrary to the generally accepted idea oxidation need not be an important factor in welding, but the addition of certain elements to the filling rod is necessary to insure sound metal in the joint. The author has obtained excellent results with a rod containing 1% of silver.

In conclusion, the author wishes to thank Professor T. Turner, in whose laboratories the work was carried out, for much invaluable help and kindly criticism.

Soldering Zinc-Aluminum Alloys

Q.—We wish to solder together two pieces of the following alloy: 6 per cent Aluminum; 94 per cent Zinc. Can you give us information on the subject of soldering?

A second alloy we are interested in is: 5 per cent Aluminum; 3 per cent Copper; 92 per cent Zinc.

A.—To solder the mixtures mentioned the surfaces should be filed or ground clean, not even allowing the fingers touch the surfaces. Use as a flux vaseline, stearin or paraffin. Do not use acid in any form. An ordinary soldering copper or blow torch, preferably the latter with a needle point can be used to furnish the heat. Any aluminum solder will do but those containing a large amount of tin will work best. For your purpose 60 per cent tin, 40 per cent zinc will be proper.

The trouble when soldering aluminum mixtures is to keep the metal from oxidizing.—W. L. ABATE.

Growth in Zinc Base Die Castings

Notes on the Die Casting Alloy Zinc, 92; Aluminum, 5; Copper, 3. Part 2.*

Written for The Metal Industry by W. G. JOHNSON, Metallurgist, Precision Castings Company, Inc. Syracuse, N. Y.

GROWTH

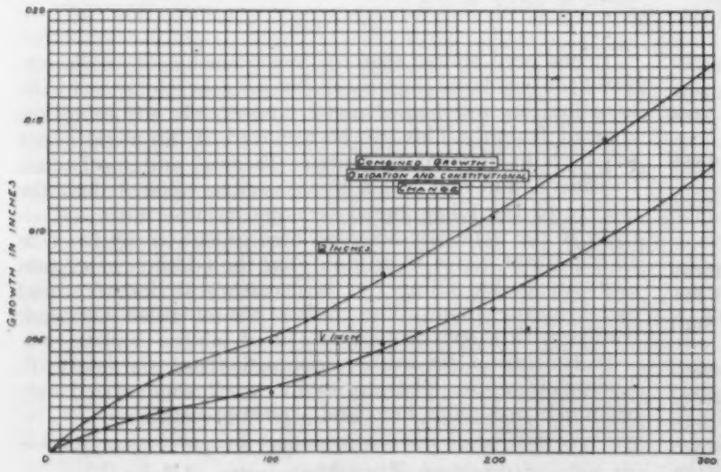
Table III and Figures 5, 6, 7, 8 and 9 show the changes brought about on the dimensions of the specimens by holding in steam, boiling water and paraffine at the temperature of steam, and paraffine at 212° F.

These results prove conclusively that growth is of two types, that due to oxidation and that due to a constitutional change. Hanson and Gayler in their paper on "A Study of Alloys of Aluminum and Zinc," as read before the March, 1922, meeting of the British Institute of Metals, divulge some very interesting information. Their work was done on quenched alloys containing relatively large amounts of aluminum. They give experimental evidence to prove that the reaction for binary high aluminum-zinc base alloys, $\beta = \alpha + \gamma$ takes place very rapidly at room temperature, and after a short time the decomposition is complete. They found a rapid increase in hardness associated with this reaction, followed by a gradual decrease, explaining the latter with a supposition that the α and γ particles coalesce, gradually growing larger in size. They also found a change in rate of decomposition with a variation in temperature. With some modification the above theory is applicable to the ternary alloy 92-5-3. In this case copper is present and serves to suppress the phase change somewhat. Thus, the reaction is completed over a longer period of time. It was noticed that on test pieces immersed in paraffine at 93° C. (200° F.) and measured after 20 hours, a slight shrinkage had taken place. However, as Table III and Figure 6 show, a growth was found at the end of the 50th hour, which increased considerably with the time. Supplementary to the work presented on the effect of holding for various lengths of time at a temperature of 93° C. (200° F.) to 102° C. (215° F.) preliminary experiments were conducted on the effect of aging over a small period of time on cast 92-5-3 test bars. It was noted that the tensile strength was consistently 5,000 to 8,000 lbs./sq. in. higher 12 to 15 hours after casting than when tests were made ½ hour after casting. Duplicate bars tested upon aging at the same temperature (room temperature) for 2 weeks showed a falling off in the above property to about that obtained originally. After further aging for a month tests showed no change in tensile strength. Holding in a dry heat at 93° C. (200° F.) to 102° C. (215° F.) merely accelerates that taking place at room temperature. The reduction in this case is considerable as has been shown elsewhere. Associated with the change in tensile properties without the presence of moisture is found a very evident increase in dimensions after a short period of shrinkage (as previously stated), and that this increase is intimately related to an increase in particle size of η and γ goes without question. The whole alloy changes uniformly. This fact is supported by the measurements showing a definite relation of 2:1 increase between the 2 inch and 1 inch sections. Micro-

TABLE III.—GROWTH AS CAUSED BY OXIDATION AND CONSTITUTIONAL CHANGE†

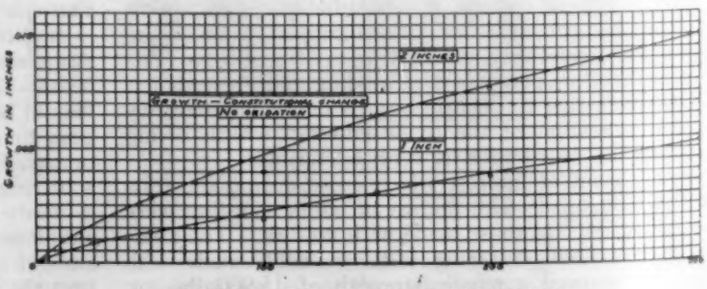
Time Held	Steam Temperature 93°C. (200°F.)		Paraffine		Steam Minus Paraffine		Boiling Water		Paraffine Temperature 100°C. (212°F.)		Boiling Water Minus Paraffine	
Hours	Oxidation & Constitutional Change		Constitutional Change		Oxidation		Oxidation & Constitutional Change		Constitutional Change		Oxidation	
	2"	1"	2"	1"	2"	1"	2"	1"	2"	1"	2"	1"
50	.0034	.0018	.0028	.0013	.0006	.0005	.0135	.0116	.0030	.0014	.0105	.0102
100	.0050	.0027	.0040	.0019	.0010	.0008	.0280	.0254	.0042	.0021	.0238	.0233
150	.0081	.0049	.0065	.0031	.0016	.0018	.0426	.0399	.0069	.0034	.0357	.0362
200	.0107	.0065	.0077	.0038	.0030	.0027	.0519	.0471	.0080	.0042	.0439	.0429
250	.0142	.0097	.0089	.0046	.0053	.0051	*	*	.0092	.0047	....	....
300	.0176	.0130	.0100	.0052	.0076	.0078	*	*	.0102	.0055	....	....

*Specimens became so warped and cracked that even squeezing together in a vice would not bring them in condition for true measurement.
† The writer has used the term "constitutional change" in referring to the increase in particle size.



HOURS EXPOSURE TO STEAM

FIG. 5. EXPOSURE TO STEAM AT TEMPERATURE 93° C. (200° F.)



HOURS OF IMMERSION IN PARAFFINE

FIG. 6. IMMERSION IN PARAFFINE AT TEMPERATURE OF 93° C. (200° F.)

*Part I was published in our August issue.

scopical evidence shows the particles of η and γ in an extremely finely divided state after aging 20 days following casting, whereas examination of specimens held for 300 hours at 93° C. (200° F.) reveals a noticeable coarsening. A fracture shows the change in this instance just as plainly.

In steam and boiling water the same effect is produced, but in addition a growth due to oxidation takes place. Subtracting that caused by the constitutional change from the results found on specimens held in both of the above media, gives that accounted for by oxidation. It is very logical to explain the growth due to the latter. In this instance the oxidation proceeds inward and there is a definite layer of oxide on all surfaces. Therefore, the growth obtained regardless of size and section would be the same. The results show that this is true.

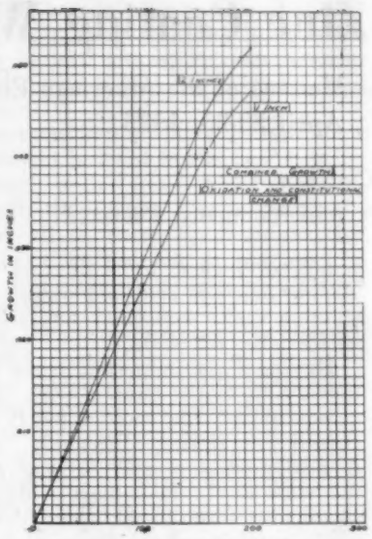


FIG. 7. IMMERSION IN BOILING WATER AT TEMPERATURE OF 100° C. (212° F.)

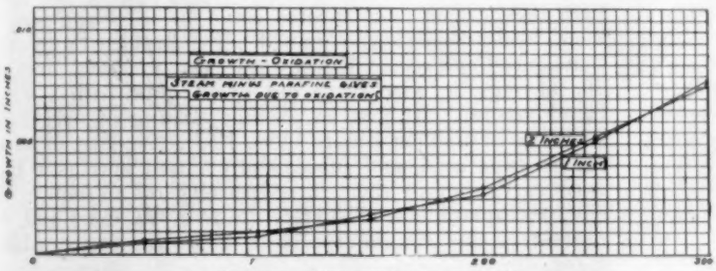


FIG. 8. EXPOSURE TO STEAM AT TEMPERATURE OF 93° C. (200° F.)

CONCLUSIONS

1. Tensile Properties.

The constitutional changes taking place; $\beta = \eta + \gamma$ and subsequently an increase in particle size of the η and γ constituents, both have a pronounced effect on strength and ductility. Time and temperature above and below the transformation point at 258°C. (496°F.) (both affecting the above changes) have a direct relation to the results obtained. Oxidation also plays an important part in lowering the strength and ductility, the degree being governed by the oxidizing media employed, the temperature and time held at.

2. Weight.

An increase in weight is associated with the amount of oxide present and is obviously not affected by a constitutional change.

3. Growth.

Growth is caused by oxidation and the increase in particle size. Time, temperature and oxidizing media subjected to all govern the degree of growth attained.

The slight shrinkage taking place is probably due to the β constituent breaking down to the very finely subdivided $\eta + \gamma$.

In conclusion it might not be amiss to touch on the practical importance of knowing that a relatively large amount of the growth and change in tensile properties is the result of the constitutional change. Where ductility and strength are of no great importance but where permanency of dimensions is paramount, if a knowledge of the maximum growth obtainable from this source is found by experiment, and that there is a direct ratio between the size of casting, castings could be intentionally made a definite undersize and subsequently annealed at a predetermined temperature, preferably just below 258°C. (496°F.) (because of the time factor) to bring the castings to the size desired. Any further growth would be a result of oxidation only, which under ordinary conditions and especially where the metal is protected by a nickel-plate, japan, etc., would take a long time. Also the fact that upon re-heating to a temperature above 258°C. (496°F.) followed by rapid cooling, a reversion of the large particles of η and γ take place to form β which is in turn re-decomposed into very finely divided $\eta + \gamma$ means the salvaging of brittle castings. Of course, the same defect will in time recur in this instance.

Experiments are under way on prolonged tests to determine the maximum growth caused by the change in question under different time and temperature conditions.

Work of a similar nature to that reported has been accomplished on numerous experimental alloys. Further work is also in progress. These data will be fully assembled and written for publication at some future time. The writer's belief is that no zinc-base alloy will be found absolutely immune from growth, as tests on the purest grades of zinc obtainable show some growth caused by oxidation. However, a few very promising alloys have been discovered in which, for all practical purposes, general permanency of size and tensile properties has been obtained. At the same time the casting properties are such that the alloys found are suitable for production.

It might be of interest to mention that experiments to date have shown that small amounts of nickel and magnesium when added to alloys similar to that under discussion exert a beneficial effect on the resultant properties, in particular decreasing the combined growth. Nickel increases the corrosion resistance, while magnesium serves to suppress the phase change and subsequent coalescing of the $\eta+\gamma$ particles. While the tensile strength remains practically unaffected upon the addition of magnesium, the impact strength is raised considerably and remains high instead of falling off with age as is the case with the 92-5-3 alloy. It would be out of place to go into detail on these alloys in the present paper.

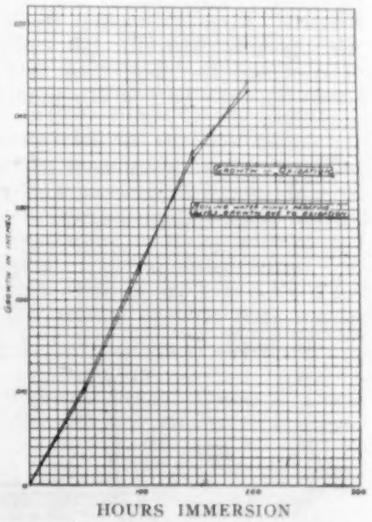


FIG. 9. IMMERSION IN BOILING WATER AT TEMPERATURE 100° C. (212° F.)

A New Method of Zinc Coating Wire

A Description of "Galvannealing," Read Before the Meeting of the American Electrochemical Society, Niagara Falls, N. Y., April 23-25, 1925

By J. L. SCHUELER

Metallurgist, Keystone Steel & Wire Company, Peoria, Ill.

So far as the writer is aware, galvannealing involves the only basic change which has been made in hot zinc-coating since Meloun developed the first process in 1742. The galvannealing process is identical with the ordinary hot zinc process up to the point where the wire leaves the molten zinc, but from there on the processes differ radically, because in the galvannealing process the coated wires are not wiped, being immediately passed into a heat-treating furnace, the heat-treatment not only smoothing the coatings, but also making them flexible and malleable.

In the description which follows, each step in the process of zinc-coating wire will be considered. Refer now to Fig. 1, which is a diagrammatic sketch of a galvannealing unit. The over-all dimensions in feet (1 foot = 30.5 cm.) are given merely for a visual guide. The wire passes from the reels into a bath of molten lead maintained at approximately 1,300° F. (705° C.) for the purpose of removing the hardness caused by wire drawing. After leaving the annealing furnace the wire travels through the air for a distance of about 90 ft. (27 m.), thus giving it time to cool at a relatively slow rate. (We are speaking now of the ordinary soft steel used for fence wire or barbed wire. If high carbon wires are used, then the essence of the process is the same, but the details such as temperature of annealing, method of annealing, cooling and so on, are different.) The wire then enters a bath of commercial hydrochloric acid (muriatic acid) so as to thoroughly clean the wire surface. This cleaning is very important; in fact, it is the essence of any coating operation, as dirty surfaces cannot be coated. The wire when leaving the acid bath is very wet and before entering the molten metal should be dried. This is done by passing the wire over hot iron plates.

The wire then enters the molten zinc bath held at a temperature of about 875° F. (468° C.). Upon leaving the zinc bath the coated wire is immediately passed into a muffle furnace, where the coating is subjected to a heat of approximately 1,250° F. (677° C.) for about fifteen seconds. After air-cooling the wire is coiled up on the take-up reels ready for fabrication. This is a continuous process and the wire does not stop from the time it leaves the reels until it is removed at the take-up end.

DETAILS OF THE GALVANNEALING PROCESS

Cleaning: Thoroughness of cleaning is essential with the galvannealing process, and the wire surface should be free of all foreign matter. The acid strength is maintained equivalent to a mixture of equal parts of 18° Baumé muriatic acid and water. The temperature of the solution varies somewhat, but is kept in the neighborhood of 180° F. (82° C.).

Drying: The next step in the galvannealing process is the drying of the cleaned wire. The danger of plunging a wet object into molten metal is obvious; that is one reason for drying. Secondly, a wet wire has steam formed around it, and so long as this steam is present the wire is not in contact with the molten metal. The steam also forms black zinc chloride skimmings and the smelters to whom this material is sold penalize the seller for the chlorine content.

When the galvannealing process was put into service, pans fourteen feet in length were used for the zinc. It was known, however, that the amount of zinc carried out of the bath by a wire was a function of the temperature of the bath and, within limits, the length of time the wire remained in contact with the molten zinc. So, in the beginning high zinc temperatures were used, averaging about 930° to 950° F. (500°-510° C.) In this manner good results were obtained so far as coatings were concerned, but it was found that by lengthening the zinc bath, lower zinc temperatures could be used and somewhat heavier coatings obtained. The problem with the galvannealing process has always been to devise means for having the wire carry out of the zinc bath a very heavy coating. At first an average coating of over half an ounce of zinc per square foot (1.53 g./sq.dm.) of wire surface was used, and subsequently raised until now the wire carries more than three-quarters of an ounce of zinc per square foot of surface (2.29 g./sq. dm.) and, if necessary, this can be raised to over one ounce (3.05 g./sq. dm.).

It is true, of course, that it is possible with the ordinary zinc coating process to carry out as much zinc on the wire as in the galvannealing process, but it is also essential that some means be taken to make the coating smooth, flexible and malleable.

It is here that the galvannealing process introduces a new step in the process of zinc-coating wire, because immediately after the wire leaves the zinc bath it passes into a heat-treating furnace. This heat-treatment not only smooths the coating, causing it to form evenly around the wire, but also makes the coating malleable and flexible. Occasionally there is a slight dusting of the coating which does not affect its durability, but if the heat-

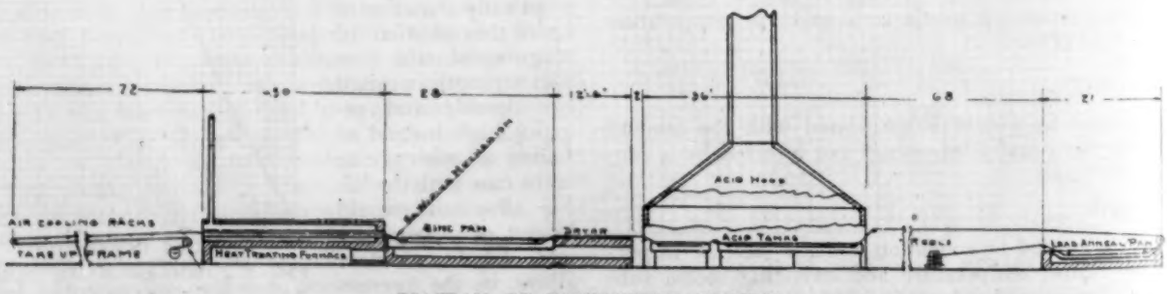


DIAGRAM OF GALVANIZING PROCESS

treating temperatures have been correct there is absolutely no cracking, flaking or peeling of the coating. The heavily coated wire may be bent around its own diameter without injury to the coating and it is not necessary that high-grade zinc be used.

For every size of wire there is probably a definite range of temperature which should be used in the heat-treating furnace above, depending on the speed with which the wire is traveling through the furnace. It is practically impossible to determine all of these combinations, but enough of them have been worked out so that our results are satisfactory. The following data will give a better understanding of what is being done.

We have a choice of three combinations for the different sizes of wire. For example, we can set the travel of the wire at a uniform speed and vary the temperature in the heat-treating furnace; or, we can leave the temperature uniform and vary the speed of the wire; or, we may vary both the speed and temperature. Our present practice is to run the wire at the rate of approximately 120 ft. (37 m.) per minute, although for wire sizes[1] smaller than 12½ (2.5 mm. in dia.) this may be increased considerably. The temperature of the heat-treating furnace is then varied, being about 1,150° F. (620° C.) for a 9 gauge wire, (0.1483 in. or 3.75 mm. dia.), 1,275° F. (690° C.) for a 12½ gauge (0.0985 in. or 2.5 mm. dia) wire and about 1,300° F. (705° C.) for a 14 gauge (0.0800 in. or 2 mm. dia.) wire. Just what temperature the coating really reaches, we have not yet been able to determine. So far, we only know to what temperature it must be subjected in order to produce the desired results.

If the temperature is too low the coating is brittle, and the same is true if the temperature is too high, the latter also causing an oxidized surface to be formed. The ranges of temperature within which satisfactory results may be obtained have not yet been determined, but we do know that they are far enough on either side of the specific temperatures given above so that we have little trouble.

After the coated wire leaves the heat-treating furnace it is allowed to cool gradually, traveling for over a minute through the air before passing into the cooling water at point Z, Fig. 1, and from the water to the take-up reels.

ANALYSES AND WEIGHTS OF COATINGS

Practically all specifications for zinc-coated wire call for the Preece (copper sulfate) test, and although galvannealed coatings average well over 7 in copper sulfate tests, we believe that the real test for zinc coatings is the amount of zinc they contain, provided that the coating is uniformly distributed around the wire. We will pass this by, for the moment, and consider it a little later.

The principal elements making up a zinc coating applied to wire by the hot process are zinc and iron. We have, and can, run the iron content of the coating on galvannealed wire up to 32 per cent, by changes in the method of heat-treatment, but have found that coatings with over 10 per cent of iron do not resist atmospheric corrosion as well as do the coatings containing lower percentages of iron. This has been noted by Oliver Storey, of the Burgess Laboratories, Madison, Wisconsin, who first called our attention to this fact, and who had gathered considerable information along this line in his study of sherardized coatings. Similar results were noted by J. C. Witt.[2] The higher iron coatings also give fictitious results (high) when the copper sulfate test is used.[3]

For these reasons we determined both the zinc and iron in the galvannealed coatings. Let us now consider some data showing the analyses of galvannealed coatings. The figures in Table I represent averages taken over quite a long period of daily operations, and are typical of what is being produced every day. The Preece test figures are shown with a plus sign. This is due to not carrying these tests to completion. If, for example, we are making a wire on a five-minute guarantee, then the men making the tests stop as soon as the wire passes six tests and so on, even though the coating has not failed. All of these tests, including those for the gauges smaller than 12½ (2.5 mm. dia.) show full one-minute tests. Some specifications call for ¾-minute Preece tests on the smaller gauges, but we have not adopted the ¾-minute test.

TABLE I—ANALYSIS OF GALVANIZED COATINGS

Wire Size		Ounces Zinc per sq. ft. of Wire	Grams Zinc per sq. dm. of Wire	Iron in Coating	Preece
Gauge No.	Dia. mm.	Surface	Surface	Per Cent	Test
9	3.75	0.883	2.69	7.24	7+
11	3.05	0.905	2.76	7.10	7+
12½	2.50	0.814	2.48	7.15	6+
14	2.03	0.750	2.29	7.57	5+
15½	1.71	0.605	1.85	8.48	4+
17	1.37	0.600	1.83	8.50	4+

The Preece test is a good indicator of the uniformity of the coating. For example, if one side of a wire fails at the end of three minutes, and the other side at the end of seven minutes, it may be assumed that the coating is not at all uniform. Charcoal wiped wires and fabricated wire products coated after weaving show this characteristic failure. The galvannealed coatings fail very uniformly, and on this basis we can safely assume that galvannealed coatings are uniformly distributed around the wire surface. The copper sulfate test is easily manipulated to give erroneous results, but for low zinc-iron coatings (less than 10 per cent iron) this test gives good comparative results when carefully carried out.

In order to get the actual amount of zinc, the coatings were dissolved cold in a three per cent by volume sulfuric acid solution. The wire was weighed before and after stripping, and the iron determined in the solution by titration with potassium permanganate.

As a check on our work we had the C. F. Burgess Laboratory, Madison, Wisconsin, and R. W. Hunt & Company, each working independently, go out on the open market and purchase rolls of zinc-coated wire fence representing the practice of the leading manufacturers as of approximately June, 1924. The galvannealed fence was picked at random by the Hunt and Burgess representatives from a warehouse stock of several thousand rolls of fence, and as a further check Oliver Storey, of the Burgess Lab., also selected at random samples of galvannealed wire from the fence machines and coating units. Hunt & Company determined the zinc in wires from each fence, but selected the wires at random. Burgess determined the zinc in the coating of every wire of each fence and from 86 samples of galvannealed wires. The gauges of wire in all cases were from 9 to 12½ (3.75 to 2.5 mm. in dia.). The results of both tests showed remarkable agreements, and are given in Table II.

	BURGESS		HUNT	
	Ounces Zinc per sq. ft. Wire Surface	Grams Zinc per sq. dm. Wire Surface	Ounces Zinc per sq. ft. Wire Surface	Grams Zinc per sq. dm. Wire Surface
Galvannealed	0.86	2.62	0.89	2.71
Nearest competitor....	0.50	1.53	0.50	1.53
All other fences.....	0.34	1.04	0.34	1.04

[1] The gauge sizes are given in numbers of the Roebling Steel Wire Gauge.

[2] Philippine Journal of Science, 2, 147-165 (1916).

[3] J. C. Witt, *loc. cit.*, also noted this, as did Cowper-Cowles, J. Soc. Chem. Ind., April 30, 1909, and Burgess, Electrochem. and Met. Ind., March 17, 1922.

This checks our own work almost exactly, and the laboratory of a large zinc company obtained similar results. These results bear out our statements that the galvannealed coating is the heaviest carried by any fabricated zinc-coated wire now being made. This is also true for the copper sulfate tests, the average for all makers of zinc-coated wire except one, being less than three dips (the exception mentioned being about three), while the galvannealed wire stood seven dips.

STRUCTURE OF GALVANNEALED COATINGS

When relying on microscopic examination alone, the determination of the structure of zinc coatings, especially on wires, is not at all a simple matter, and the structures thus reavealed are not easily identified, especially when they are not sharply defined. For this reason we adopted an analytical method for determining the composition of the galvannealed coatings.

The method used was as follows: Sections of wire approximately 5 ft. (1.5 m.) in length were selected and cut into two lengths of 30 in. (76 cm.) each. Each of the wires were then wrapped around a mandrill, about 2 in. (5 cm.) in diameter. One of the spirals thus formed was weighed, placed in a 400 cc. beaker, and then covered with a cold dilute sulfuric acid solution. This solution was made by adding 3 cc. of concentrated C. P. sulfuric acid (sp. gr. 1.84) to 97 cc. of distilled water.

As soon as the coating was removed, as indicated by the ceasing of effervescence or bubbling, the wire was removed, the adhering solution washed back into the beaker, and the coil dried and weighed. The difference in weight gave the weight of coating removed. The solution was then diluted to 300 cc. and titrated with $N/20$ potassium permanganate solution, to determine the amount of iron of the coating. With the exception of the wire made by one manufacturer, the sulfuric acid solution had no appreciable action on steel wire.

The time necessary to remove the coating was noted, and this, together with the weight of coating per unit area of the wire, and the total iron in the coating gave the basic data for the following: Let us say that it took fifteen minutes to remove the coating, then we could assume that fifteen one-minute immersions of the wire in the sulfuric acid solution would produce the same result. As a matter of fact, it does not work out that way; but if the wire is weighed, immersed for one minute, removed from the solution, washed, dried and reweighed the proportionate amount of coating removed is obtained. Titrating the acid solution with potassium permanganate gives the amount of iron in that portion of the coating removed. By repeating, using a fresh sulfuric acid solution each time, until the entire coating was removed, data are obtained as to the distribution of the iron in the zinc coating. We used intervals of stripping averaging from ten seconds upwards, depending on the gauge of the wire, thickness of coating and the manner in which the coating was produced.

In a series of galvannealed coatings, the following results were obtained: The inner section close to the surface of the wire, and comprising about three per cent of the coating, is $FeZn_3$; the next fourteen per cent of the coating is $FeZn_7$; and this is followed by a heavy section of principally $FeZn_{10}$ comprising about 60 per cent of the coating. The outside 23 per cent of the coating shades down from a four per cent iron alloy to a surface coating of approximately the same purity as that of the coating bath.

The surface of the coating contains a very high percentage of zinc, the iron being very low, the iron content gradually increasing as the surface of the steel is approached. Over 35 per cent of the outside thickness of the coating contains less than 7.5 per cent iron at the highest point. Consequently, we may assume that all of this iron is in solution. Fully 75 per cent of the outside thickness of the coating contains less than 10 per cent iron in any part of the coating. One-half of the total iron is divided throughout 85 per cent of the outside thickness of the coating, the remaining half of the iron being in the 15 per cent of the coating next to the surface of the wire.

CORROSION TESTS

We have subjected galvannealed coatings to several accelerated corrision tests, such as the salt spray, acid fumes from pickling vats, ammonium chroride solutions and very weak acid solutions. In every case the galvannealed coating outlast that applied by the ordinary hot zinc process. We are not submitting data on this subject because we are not yet convinced that an accelerated corrosion test is a proper index of the life of a coating. Furthermore, as most of these accelerated corrosion tests were made by other laboratories than our own and showed very favorable results, we feel that we can take the stand which we have, without undue criticism.

The real test for a protective coating is to subject it to the same conditions for which it is to be used. With this in mind, we have erected a number of panels of woven wire fencing and barbed wire, and also wires zinc-coated by various methods now in use. These samples have only been up about two years, but on the smaller gauge wires results are showing plainly. The ordinary zinc-coated wires are all rusted, some of them badly, whereas the galvannealed wires, although somewhat darker in color, are apparently in as good a condition as when they were erected. The ends of the knots on the galvannealed coated fences, and which are not zinc-coated, have not yet rusted. This shows clearly the zone which is protected by zinc, in the cases cited being about 0.125 in. (3.2 mm.).

The barbed wire is in equally good condition. The cut ends of the barbs on the ordinary coated wires are all rusted, whereas a careful inspection has not revealed a single galvannealed barb which has any sign of rust.

The results of these tests are, of course, the real measure of the protective action of galvannealed coatings, and, as was said before, it stands to reason that a heavy, uniformly applied, nonporous zinc coating should outlast a thinner coating. The results so far obtained bear this out fully.

SUMMARY

1. Galvannealing a new process for zinc-coating wire, has been described.

2. It has been shown that a very heavy zinc-coated wire may be fabricated, when produced by the galvannealing process.

3. Data have been submitted showing that galvannealed wires carry a much heavier coating on woven wire fencing than that produced by any other known commercial process.

4. The structure of the coating contains pure zinc, $FeZn_{10}$ $FeZn_7$ and $FeZn_3$.

5. Some atmospheric corrosion tests now under way have been described and indicate the superiority of the galvannealed coating over the ordinary zinc-coated wire.

6. The galvannealing process is the only known process whereby Prime Western zinc may be used to produce heavy coatings which will stand fabrication. It is the only hot zinc-coating process for wire now known whereby wiping is eliminated, and no other woven wire fencing or barbed wire now being made has a coating as heavy and as uniform as the galvannealed coated wire.

Blushing or Clouding

Causes and Prevention of These Defects in Lacquered Metal Products

Written for The Metal Industry by W. J. SMART, General Manager, Eureka Pneumatic Spray Company, Richmond Hill, Long Island, N. Y.

Since the first production of air drying cotton lacquers and lacquer products, there has probably been nothing which has given the users so much trouble as the so-called blushing, fogging or smoky appearing surface which occurs on the work mainly during the summer months. This also occurs with other solutions used in industrial finishing, though probably to a lesser extent.

Moisture is at all times present in the atmosphere. For instance, a day in summer which may seem abnormally hot will not register on the thermometer as hot as perhaps the preceding day, which was in reality five or six degrees hotter yet did not feel so hot. The oppressive feature of what we call a hot day is the excessive moisture in the atmosphere, called "humidity." It is this moisture beyond any question which causes the smoky appearance.

Compression of air always creates frictional heat. Expansion of air under pressure being discharged through an orifice is quite the reverse, creating cold varying with the compression. This chills the surface being finished.

Also the solvents of lacquers and other solutions being more or less volatile, create additional cold by evaporation, on the surface being finished. This joint refrigerating influence tends to condense the moisture in the atmosphere, depositing it with the finishing solution on the freshly finished surface, with the inevitable result that the moisture so deposited "milks," or turns the surface cloudy.

The writer has tested a sheet of metal, blowing a volatile lacquer on it on a very humid day, and found that these joint refrigerating influences would condense the atmospheric moisture on the underside of said sheet of metal, where it would form in drops. It is of course indisputable that if the surface becomes cold enough to condense the atmospheric moisture on the underside of the sheet of metal, it will likewise condense the moisture on the side being finished, though the moisture on that side will remain mixed with the solution, afterwards turning it milky.

We have all noticed at times moisture forming on the outside of a water pipe on humid days. Sometimes this has been mistaken for a leak. The reason of course is that the pipe, being cold, condenses the atmospheric moisture, which forms in drops on the cold surface. This is exactly what gives the trouble with spray finishing.

In overcoming this trouble, the first requisite is that the pipe used should be either galvanized iron or brass. Secondly, all overhead pipe should be hung with the far end slightly higher than the end toward the air receiving tank, permitting drainage of condensation, which inevitably occurs in the overhead pipe line, back to the air tank where it can be drawn off at the cock provided on the tank for that purpose. All branches, or drops, should first point upward, not down, and then by the use of return elbow, come down to the spray booth. The return elbow prevents drainage into the branches. The slight amount of condensation which may occur in the branch from the ceiling to the booth, can readily be taken care of by the use of a small air filter at each outlet where the sprayer hose connects.

The use of an air scrubber is also advised. This can be placed in most cases alongside the air receiving tank. Air is taken from the air receiver into this purifier, discharged near the bottom of same, rising up through a water seal to the upper chamber of scrubber; removing all dirt, oil, oil vapor, and even condensing and removing gasified oil and a large amount of atmospheric vapor contained in the compressed air. The purified air may then be piped to the spray booths.

By following these instructions, everything possible as regards the air supply has been taken care of. There is no need of a refrigerating plant, and it is my opinion that while such a plant will do no harm, it is very expensive and will not take care of the surrounding atmosphere, leaving the user in the same dilemma.

The surrounding atmosphere cannot of course be dehydrated, but users can do a great deal to help themselves if they will first prevent all drafts by keeping all windows and doors closed. Secondly, see that the room is kept warm; if necessary, heat it. The heated finishing room in summertime will not seem as hot to the operator as it would if it were not heated and all windows open. Heating the room will dry the atmosphere which comes in contact with the finished surface, and assist to a large extent in preventing blushing.

Devices for passing the air in the pipe line into a bottle or chamber in a whirling manner to produce a centrifugal flow, will not abstract vapor; though admittedly said devices will abstract existent condensed moisture in the pipe line. A device of this nature may be merely wasted.

If the above rules have been adhered to, a final precaution should be borne in mind at all times, when the weather is excessively humid. Most manufacturers of lacquers and other finishing products, particularly since the war, have been using solvents and thinners much more volatile than theretofore. Users should have their lacquer or supply house furnish them with slow-drying, though more expensive, thinners, for humid weather only.

Close attention to these points will assure all users maximum efficiency in the remedying of their greatest summer finishing problem.

Another trouble which many have had to contend with where the finishes are either transparent or delicate in color, has been the spotting or brown specks which would show up. This has caused considerable trouble, and has frequently been blamed on potash, whereas it is nothing but oil from the compressor, which would pass from the heated air compressor with the air, through the pipes, and even though carried along in the form of vapor, at the point of discharge through the spray nozzle, the expansion of air will create sufficient cold to condense this vapor into small particles, and this causes the spotted effect on the work. The use of an air scrubber will eliminate this trouble.

Automatic Hot Tinning Machine

Q.—Will you please tell us if to your knowledge there are any automatic or semi-automatic tinning machines on the market; machines that will carry an article first from the flux into a tin bath, and from there into another kettle, with a final shaking operation to remove surplus tin?

A.—So far we can find no machinery concern that builds equipment such as you require. As you desire a complete process for your work, it would have to be designed on the job.—W. L. ABATE.

Smelting Secondary Aluminum and Aluminum Alloys

A Series of Articles on the Reclamation of All Forms of Scrap and Used Aluminum and Aluminum Alloys. Part 2. Magnitude of the Secondary Aluminum Industry*

Written for The Metal Industry by Dr. ROBERT J. ANDERSON, Consulting Metallurgical Engineer

Statistical data show that in the past ten years a large industry has been reared in the United States in secondary aluminum, and in the 10-year period 1913-1922, inclusive, the total amount of the secondary aluminum and aluminum alloys recovered in this country was 255,014,000 lbs., valued at $91,295,320. The secondary metal, selling at a lower price than primary aluminum pig, displaces an equivalent amount of new metal, and it accordingly must be considered by primary producers. Of rather greater importance to the consumer of aluminum manufactures, is the fact that the use of increasing amounts of secondary metal helps to lower the price.

The employment of secondary aluminum and aluminum alloys has increased rapidly in recent years, and any legitimate steps that can be taken to overcome trade objection in certain quarters to the use of good secondary metal will not only result in better business for the secondary smelters but will also lower the cost of aluminum manufactures to the ultimate consumer. There are many possible applications of aluminum that are now out of the question because of the high price of the metal. Of course, for some manufactures, e.g., aluminum wire in which special purity is required, it is quite necessary to employ only high-grade primary metal, since it is normally impossible for secondary aluminum to meet the specifications, but in alloy-castings production, as well as in sheet rolling, secondary metal can be used either entirely or in part. In fact, this use of secondary aluminum and aluminum alloys is rapidly increasing. A still greater amount of secondary aluminum could be used if the various scraps were handled more carefully and kept cleaner before reaching the smelter, and, of course, as the quality of the products produced by the smelter become better, trade objections will gradually disappear.

As indicated in the previous article, aluminiferous scrap available for smelting recovery by the secondary plants arises from five main sources; (1) drosses and skimmings from melting aluminum and aluminum alloys; (2) clippings and related scraps from fabricating aluminum and its light alloys; (3) borings from machining light alloy castings; (4) castings and other scrap from the junking of old motor cars; and (5) miscellaneous sources. While some smelters may depend largely for their scrap supplies upon particular concerns or sources, other smelters are dependent in large part upon the open scrap market, and all smelters buy in the open market. It is of interest, therefore, to consider the main sources of scrap available to the secondary smelter and to indicate the approximate amounts[1] of the several scraps arising yearly in the United States.

AMOUNTS AND SOURCES OF SCRAPS AVAILABLE TO THE SECONDARY SMELTER

Drosses And Skimmings: The amount of aluminum melted annually in the United States varies greatly, depending upon industrial conditions[2], but taking the year 1923, the amount may be placed at about 245,000,000 lbs. Of this, about half is melted for the production of aluminum rolling ingots and wire bars, while the other half goes into the production of aluminum-alloy castings. The gross loss in dross and skimmings is at least 2 per cent, and since all of the metal used is melted at least twice, the actual amount of dross produced per annum is of the order of 9,600,000 lbs. If dross contains on the average 50 per cent free metal, then there is about 4,800,000 lbs. of aluminum and aluminum alloys possibly recoverable from this amount of scrap. The average recovery from dross is certainly not over 70 per cent, so that the amount of metal obtained by smelting all the dross would not be more than 3,360,000 lbs. Now, it should be stated that the total amount of dross produced annually in the United States is not available to the secondary smelters, since of the total aluminum melted, viz., 245,000,000 lbs., on the basis of 1923 figures, some 214,000,000 lbs. is melted at least once by the Aluminum Company of America (the sole producer), and the balance of 31,000,000 lbs. comes in by import for melting largely by foundry consumers. Since the Aluminum Company of America operates secondary recovery plants, much of its dross is recovered internally and does not appear on the market.

The dross available to the secondary smelters comes largely from the foundry industry, and since in 1923 about 100,000,000 lbs. of light alloy castings were produced, of which about 75 per cent was made in independent foundries, the amount of foundry dross available for smelting recovery was of the order of 1,500,000 lbs.[3]

Fabricating Scrap: The amount of aluminum, as such or in the form of alloys, which was used in the production of wrought and fabricated manufactures in 1923 was of the order of 120,000,000 lbs. The scrap arising in working and fabricating aluminum and its light alloys comes in the production of sheets and shapes, wire, utensils, automobile bodies and trimmings, stampings, and pressings. On the basis that half of this amount of metal is fabricated by the Aluminum Company of America and the remainder by other firms, and that the average amount of waste in the production of various manufactures is 25 per cent, then some 15,000,000 lbs. of scrap in the form of clippings, punchings, light "hay", and spoiled pieces are available to the secondary smelters. This type of scrap is normally clean and of good quality, and it forms the basis for the production of secondary 98-99 per cent of aluminum pig. The possible recovery on this scrap is up to 98 per cent, or even more.

Fabricating scrap is available to the secondary smelters largely from automobile body makers, utensil manufacturers, and many small stamping shops.

Borings And Related Scraps: Of a total production of 100,000,000 lbs. of aluminum-alloy castings in 1923, about 92 per cent was for the automotive industry, where the parts are subjected to considerable machining. The percentage of weight machined off from

* Part I was published in our issue of January, 1925.

[1] It should be noted that many of the data given in this article are simply estimates based on the best figures available.

[2] For statistics of consumption see The Mineral Industry during 1922, vol. 31, 1923, chapter on aluminum and bauxite, by R. J. Anderson, pp. 8-37.

[3] The actual amount available was undoubtedly more, since a considerable amount of the dross produced by the Aluminum Company of America unquestionably comes into the market through second hands.

rough aluminum-alloy castings, according to data obtained by Gillett and James[4], is about 15 per cent on the average.

According to the makers of a motor car in the $2,000 class, in which 47 aluminum-alloy castings are used, the total weight of the rough castings for each car is 166.19 lbs., and the loss per car in borings owing to machining is 25.15 lbs. or 15.1 per cent. On the basis that 15 per cent of the metal is machined off and that 100,000,000 lbs. of castings are produced, the annual production of borings is at the rate of 15,000,000 lbs. (1923 basis). While the bulk of this amount of alloy is available to the secondary smelters for recovery, there is an increasing tendency on the part of motor-car manufacturers operating foundries to put in recovery plants and treat their own borings. This may mean eventually that serious inroads will be made on this type of scrap available to the secondary smelters.

Borings and related scraps form the basis for the production of so-called "casting aluminum," and when borings of known and definite composition are properly smelted in separate lots, quite satisfactory secondary aluminum-alloy pig can be made. The average recovery on smelting borings is not over 80 per cent, so that about 12,000,000 lbs. of secondary aluminum-alloy pig arises from this source.

Automotive Junk: Heavy automotive scrap, like crankcases and transmission housings, make desirable material for remelting, and this scrap is purchased by foundries for direct melting to castings. Hence, there is competition between the smelters and the foundries for this class of material. Foundry consumers can afford to pay higher prices for heavy automotive scrap than can the secondary smelters, and the use of this type of scrap for running directly into castings is increasing. If, in round numbers, 1,000,000 motor cars are scrapped annually, of which at least half contain some 60 lbs. of aluminum and aluminum alloys per car, then the amount of scrap arising as automotive junk is of the order of 30,000,000 lbs. Probably half of this finds its way to the smelters and the rest goes to foundries. The recovery on smelting heavy automotive scrap to pig should be high, up to 98 per cent and even more.

Miscellaneous Scrap: The amount of miscellaneous scrap including old aluminum wire, aluminum foil, discarded vessels and utensils, collapsible tubes, and small pressed and stamped articles bulks moderately large. Some of this scrap is lost and never recovered, while the remainder usually finds its way along with other scraps through the hands of scrap dealers to the secondary smelters.

Summary: Summing up the data contained in the foregoing, Table 1 shows the kinds and total amounts of the scraps produced and the probable amounts available to the secondary smelters, as well as the average recovery obtained. On the basis of the figures, and referring only to the scrap handled by the smelters (omitting that run by the domestic producer of aluminum), there are some 45,500,000 lbs. of metal in the form of scrap available, of which 85 per cent, or 38,700,000 lbs. is recovered.

RECOVERY OVER A 10-YEAR PERIOD.

The growth of the secondary aluminum smelting industry has been rapid, and the figures in Table 2 give the amounts of aluminum, as such and in the form of alloys, recovered and the total value thereof for the 10-year period 1913-1922. The figures are those reported by the smelters to the U. S. Geological Survey. Fig. 1 shows these data plotted in graphical form. From 1913 to 1917, inclusive, a greater amount of aluminum as such was recovered than in the form of alloys, but since 1917, the recovery of alloys has preponderated. The total recovery in 1923 was the largest in the history of the industry, this amounting to 42,600,000 lbs., as reported to the U. S. Geological Survey, valued at $10,824,600. The secondary aluminum industry, along with that of other non-ferrous metals, has been surveyed annually since 1912 by J. P. Dunlop of the U. S. Geological Survey[5].

LOCATION OF THE INDUSTRY.

Nearly all of the production of secondary aluminum and aluminum alloys is made in the states of Ohio, Michigan, Illinois, Wisconsin, Indiana, Connecticut, New York, New Jersey, Massachusetts, and Missouri. In 1913, 60 per cent of the production came from Ohio, Illinois, and Michigan. In 1914, 44 per cent came from Ohio and Michigan, 44 per cent from Illinois and Wisconsin, and 8 per cent from New York, New Jersey and Massachusetts. In 1915, 50 per cent was produced in Ohio and Michigan, 25 per cent in Illinois and Wis-

TABLE 1.
Kinds and amounts of high aluminum-bearing scraps produced annually in the United States.[a]

Kind of scrap	Total amount produced, lbs.	Amount available to secondary smelters, lbs.	Approximate average recovery on smelting per cent
Drosses and skimmings..	4,800,000 (as free metal)	1,500,000+	70
Fabricating scrap.....	30,000,000	15,000,000	90-98
Borings from machining..	15,000,000	12,000,000	80
Automotive junk.....	30,000,000	15,000,000	95-98
Miscellaneous.....	3,000,000	2,000,000	85
Totals.....	82,800,000	45,500,000	Aver. recovery 85

[a] 1923 basis.

TABLE 2.
Recovery and value of secondary aluminum and aluminum alloys in the United States, 1913-1922.[a]

Year	Aluminum recovered as such, lbs.	Aluminum alloys recoverd, lbs	Total recovery, lbs.	Total value
1913....	4,396,000	4,912,000	9,308,000	$2,199,480
1914....	5,582,000	3,462,000	9,044,000	1,673,140
1915....	11,400,000	5,600,000	17,000,000	5,802,100
1916....	25,800,000	12,800,000	38,600,000	23,430,200
1917....	13,320,000	18,880,000	32,200,000	16,711,800
1918....	12,100,000	18,000,000	30,100,000	10,113,600
1919....	12,034,000	25,348,000	37,382,000	12,014,600
1920....	10,000,000	21,000,000	31,000,000	9,489,100
1921....	7,300,000	10,500,000	17,800,000	3,775,400
1922....	14,380,000	18,200,000	32,580,000	6,085,900
Totals..	116,312,000	138,702,000	255,014,000	91,295,320

[a] Statistics of J. P. Dunlop, U. S. Geological Survey.

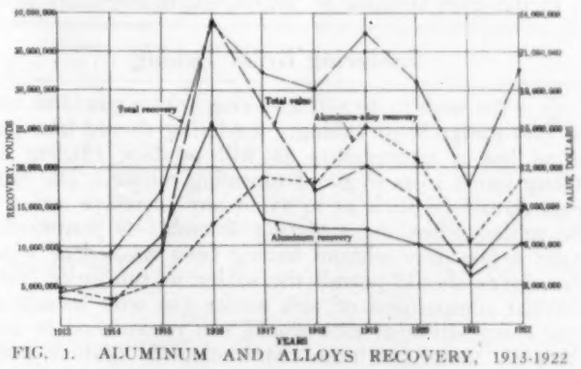


FIG. 1. ALUMINUM AND ALLOYS RECOVERY, 1913-1922

[4] Gillett, H. W. and James, G. M., Melting aluminum chips, U. S. Bureau of Mines Bull. 108, Aug., 1916.

[5] See volumes of Mineral Resources of the United States as applying to calendar years 1913 etc.

consin, and 17 per cent in New York, New Jersey and Massachusetts. In 1916, 43 per cent came from Ohio and Michigan, 27 per cent from Illinois and Wisconsin, and 18 per cent from the three eastern states mentioned. In 1917, practically all of the output came from Ohio, Michigan, Illinois, Wisconsin, and Connecticut, while in 1918 and 1919, the principal producing states were Ohio, Michigan, Connecticut, Illinois, Indiana, and Wisconsin. In 1920, nearly all the production was made in Ohio, Michigan, Connecticut, Illinois, and Missouri, while in 1921 and 1922, Ohio, Michigan, Connecticut, Illinois, Wisconsin, and Missouri were the main producers[6].

Following is a list which includes most of the concerns which produce secondary aluminum and aluminum alloys in important amounts:

1. Apex Smelting Company, Chicago, Ill.
2. Cleveland Electro Metals Company, Cleveland.
3. Cohn and Company, L., Chicago, Ill.
4. Columbia Smelting and Refining Company, New York, N. Y.
5. Great Western Smelting and Refining Company, Chicago, Ill., and St. Louis, Mo. (member of Federated Metals Corporation).
6. Hilb, Charles L., Smelting and Refining Company, Cincinnati, Ohio.
7. Jobbins Company, Inc., W. F., Aurora, Ill.
8. Lowenthal Company, Chicago, Ill.
9. Michigan Smelting and Refining Company, Detroit, Mich.
10. Missouri Smelting and Aluminum Company, St. Louis., Mo.
11. National Smelting Company, Cleveland, Ohio.
12. Peninsular Smelting Company, Detroit, Mich.
13. Progressive Metal and Refining Company., Milwaukee, Wis.
14. Standard Aluminum Company, South Bend, Ind.
15. United Smelting and Aluminum Company, New Haven, Conn.
16. United States Aluminum Company, Niagara Falls, N. Y. (subsidiary of Aluminum Co. of America).
17. United States Reduction Company, East Chicago, Ind.

[6] According to data by J. P. Dunlop.

The Use of Abrasives

The article by S. A. Cochell in THE METAL INDUSTRY for March, 1925, on the Use of Abrasives attracted considerable attention and some comment. Below are some of the opinions of those interested in abrasives.

WALTER C. GOLD, PHILADELPHIA, PA.

I have never heard of using gum in glue for polishing wheels. I do not believe in the use of a filler. You will note also that the author of the article has to use emery with the "Artificials" in order to get results. If the emery was of the correct grade and quality, he should get very satisfactory results without the use of "Artificials." It is a compliment to the emery when the confession is made that emery is needed to make the artificials work.

DELANEY & COMPANY, INC., PHILADELPHIA, PA.

We have heard of all sorts of schemes to mix glue with various ingredients, but all they do is cut down the value of the glue. If their glue is properly put on, they would not need to use any fillers. If this was the case, the abrasive manufacturers themselves would use a filler in making their abrasive paper and cloth. They use nothing but a pure high grade animal glue.

If the glue remains in the liquid, it continues to deteriorate, but if a small amount is left in the pot, it can be poured out in a rather flat pan so that it will chill more quickly and remain in the jelly form overnight. As soon as the glue becomes jelly, deterioration is reduced to a minimum. It can then be remelted and the next morning, used satisfactorily. There are no printed directions for this that we know of.

In reference to the glue left in the pots, the glue will chill and therefore keep better than if in a hot, liquid state. It is therefore better to leave the cover off so that the head will be dispersed more rapidly.

FROM A PROMINENT ARTIFICIAL ABRASIVE COMPANY

In the article Mr. Cochell refers to the prices of artificial grain as from 14c. to 16c. per pound which is entirely out of line with present selling prices. This we consider confusing to the trade.

Furthermore, Mr. Cochell implies that glue standing over night remains satisfactory for use. We do not agree at all with this statement, for practice has determined that there should be a new glue mix made up for each day's use.

On the whole, however, we consider Mr. Cochell's article quite interesting and instructive.

Soldering Brass Tubing

Q.—We wish to do soft soldering with a gas blow torch on thin gauge brass tubing. Soldering should take place at as low a temperature as will produce efficient and strong joints so as to avoid annealing tubing. The fluxes used should be such as to avoid any corrosive action on the tubing when the soldering assembly is permitted to stand a few days without having been washed or wiped. The fluxes should permit the solder to run quite freely.

What composition of soft solder (in wire form) and what composition of flux would you recommend to most efficiently comply with our requirements? Is there a self-fluxing soft solder in the market which would comply with these requirements, and also be more efficient in large production than using solder and flux separately?

A.—Would suggest a mixture of tin, 60 parts; lead, 35 parts; bismuth, 5 parts. Flux with 1 part lactic acid; 1 part glycerine; 8 parts water.

Chloride of tin mixed with starch, also chloride of zinc, both make good fluxes without fumes.—W. L. ABATE.

Polishing Wheel Chart

Q.—We are interested in obtaining a polishing wheel chart, which gives the horse power required for various sizes of polishing wheels, and different speeds.

A.—I do not know of any chart in existence which would to any satisfactory degree of accuracy give the horse power required for various sizes of polishing wheels at different speeds.

If you will note for a moment that a 24″ wheel is used in the cutlery trade for very delicate work, with a very light contact with the work, as one thing; and then that the same kind and size of a wheel is used for the coarsest abrasives in plow work where the operator forces the heavy work against the wheel in the most powerful and abusive manner, you will appreciate the difficulties that would be encountered in the enormous ranges of work as well as the ranges of wheel sizes and speeds that would be involved.—B. H. D.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers

Published Monthly—Copyright 1925 by THE METAL INDUSTRY PUBLISHING COMPANY, Incorporated

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year : : SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should Be Registered

ADVERTISING RATES ON APPLICATION. FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon.....Editor and Publisher
Adolph Bregman.....Managing Editor
Thomas A. Trumbour.....Business Manager
Evan J. Robinson.....Advertising Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number: Beekman 0404. Cable Address: Metalustry

Vol. 23 New York, September, 1925 No. 9

Contents

Buyers' Guide—Advertising Page 83. Edition this month, 6,000 copies.

EDITORIAL

FOUNDRYMEN'S CONVENTION

The approaching convention of the American Foundrymen's Association, to be held in Syracuse, New York, October 5-9, brings to mind again the fact that no foundryman who can possibly manage to spend a week away from his business, should miss these conventions. It is a mistake to suppose that a business will fall apart if its owner leaves it for a short time. As a matter of fact it is more likely to die of dry rot if he does not get out occasionally and find out what is going on in his trade.

A list of activities in the foundry industry, to be credited particularly to the American Foundrymen's Association, will show how important it is to keep in touch with its proceedings. The Molding Sand Committee has practically standardized tests for sands which will eventually enable the foundryman to check up his molding sand just as he checks up his metal. The non-ferrous metallurgical division has carried on experiments to determine the cause of difficulties encountered by the manufacturers of builders' hardware in obtaining sound casting of nickelene (nickel brass or nickel silver). A series of tests by another committee is being carried out on core oil and core binders. The general study will include the following:

1. A determination of the tensile and transverse strength of cores made from different binders.
2. The gas evolved from cores.
3. The adhesion of core sand mixtures to core boxes.
4. The rate of moisture absorption by cores.
5. The porosity of cores.

These are a few of the projects sponsored by the Foundrymen's Association. They form only a part of the incentive for attending conventions. The papers read, the discussions which follow and the exhibition of equipment and supplies, are all additional irrefutable arguments. They all lead us to the obvious conclusion that no foundryman can afford to miss the Foundrymen's Convention.

SECONDARY METAL

According to the statistics gathered by the Bureau of Mines, secondary metals recovered in 1924 amounted to about $199,000,000, about $6,500,000 less than in 1923. According to J. P. Dunlop who compiled the figures this decline is due to the fact that a smaller amount of brass scrap was remelted and the price of copper was a little lower.

Analysis of these figures shows that this small decrease was not caused by a slump in the industry. The secondary metal business has no unfailing source of supply. It has no ore resources like mines, which it can take out, or leave in the ground as conditions dictate. It must depend entirely upon the quantity of metal provided by primary sources, and shape its operations very closely with the metal market.

It is noteworthy that the regular refineries treating ore increased their consumption of scrap copper by nearly 12,000 tons but that the secondary smelters recovered about 11,000 tons less than in 1923. This would indicate that the primary refineries have become aware of the possibilities of refining secondary material and are going into that field with increased vigor. However, it will take a number of years' progressive increase to prove this point.

Pure lead recovered decreased, but alloyed lead, including antimonial, increased. Zinc was affected in the same way. Tin, antimony, aluminum and nickel all increased in quantity and value. It is important that the quantity of clean tin plate scrap treated in 1924 was slightly higher than in 1923, but that for the first time in many years no tin was recovered from tin coated containers, cans, etc., as the cost of collecting and shipping was prohibitive.

Interested as all must be in the state of any metal market, it would seem that the secondary market furnishes only an imperfect index to business conditions in these trades. Its operations are the effect of conditions dictated from other sources rather than the cause, and in its operations it must necessarily follow the trends of the primary industries.

WEIGHT OR NUMBER?

The question of selling by weight or number, now being discussed by the members of the bolt, nut and rivet industry in this country, will interest foundrymen as it covers a phase for a long time a point of contention with jobbing foundrymen and platers. Shall the system of buying castings by weight give way to the system of buying by the piece or number of pieces?

The jobbing foundry is the recipient of requests for castings of every conceivable size and shape. A surprising number of its orders are for one piece. On these pieces as well as on large lots he is asked to quote by weight. Small castings, large castings, thick and thin castings, simple castings, complicated castings—all are sold by weight.

What is the answer? There is no answer. The foundry trade is used to this condition, so it meets it. The foundryman is constantly in hot water on so many other scores, such as price-cutting, purchasing agents' tactics, to say nothing of technical difficulties, that he has hardly time or energy to attack the problem of methods of selling. And the custom which is long entrenched goes on becoming stronger and stronger, simply by antiquity.

To change overnight is of course, impossible, but a gradual swing-over is not out of reason. A beginning

could be made by quoting in two ways, namely per pound and per piece. The weight of the casting can be figured as at present by comparing its specific gravity from known composition, with the specific gravity of the pattern. Eventually the gradually instituted change would take effect and castings could be priced intelligently, basing estimates not only on the amount of metal but on the complexity of the casting, the number of cores, the difficulties involved in melting, etc.

Foundrymen have enough troubles so that they hesitate to start on a fresh attempt at education of their customers, but such a campaign would have the effect of eliminating one of their real irritations.

TRADE SCHOOLS

One of the ever-pressing needs of the metal industries is for new blood among the workers. Skilled molders are now hard to get, as are first-class platers because of the difficulty of pursuading boys to enter these trades. Their method of apprenticeship is long, arduous and uninspiring. They have to spend years doing work which seems to lead to nowhere and has not even the attraction of adequate financial reward. Consequently, they prefer to go into a white-collar job or at any rate into some shop which is less distasteful than the foundry or plating room.

One of the reasons for this condition is clearly set before us in the new Directory of Trade Schools issued by the Federal Board for Vocational Education in Washington, D. C. A glance through this book discloses only one trade school giving a course in brass foundry practice, namely, the Bridgeport, Conn., State Trade School. Silversmithing is taught only by the State Trade School in Meriden, Conn. Metal trades (but with no explanation as to what sort of metal trades) are taught in four schools. Electrotyping is taught in only one, in Kingsport, Conn. Electroplating seems to be without any school and molding has only seven schools in which it is taught.

Here perhaps is part of the answer. It is undeniable that times have changed and that boys are able to demand more attractive conditions than they could formerly. If they are going into trades they want something with a future and the possibility of advancement by learning something. The old apprentice system is of course, nonexistent except in rare instances; the modern method of learning is to go to a trade school and then practice what has been taught. But if there are too few shop schools, there will be too few boys to work and only those who are forced in by pressure of circumstances or inability to get into other lines of work, will be available. It is hardly a re-assuring condition.

There should be more schools to supply help for the metal working industries. If conditions now do not permit the operation of such schools, they could be aided by the co-operation of manufacturers. It would be a decidedly long-headed policy for manufacturers to finance a school co-operatively in their vicinity to assure them of an adequate supply of skilled and trained help.

ADVERTISING ETHICS

Every new industry and profession in its early days has its difficulties in building up a code of practice and a set of professional ethics. Such a code is not made up arbitrarily but as a result of experience, and often trouble. The advertising business is no exception to this rule. It started out many decades ago as a totally new idea, grew very slowly for a long time, and then suddenly, within the last twenty-five years has expanded by leaps and bounds to undreamed proportions.

With such a sudden expansion came many problems, the most important of which was the question of ethics. Advertising is now recognized, as stated by Secretary Hoover before the 21st Annual Convention of the Associated Advertising Clubs of the World, at Houston, Texas, in May, 1925, as a vital part of our economic system. "It has found itself a most serious purpose. This purpose is to create desire and to create good will in order to make that desire permanent."

This is, of course, most directly applicable to advertising addressed to the general public. Trade advertising is not meant to create desire, but to spread information about products which will be profitable purchases for their intended users, enabling them to produce their goods at lower cost and in better quality. Of course, such advertising must also create good will, and in order to do so it must be backed by sound merchandise. An inferior article cannot safely be advertised. A good product may make its way in time without advertising, but will move very much faster with it.

One of the evils of public advertising, very rarely found in trade advertising, is the spending of so much money that it adds materially to the cost of the article. Trade products are sold to shrewd buyers who understand costs and can judge values. Unless protected by basic patents and free from competition, they must be sold at a price which seems fair, and they must pay for themselves within a reasonable length of time. The business of making a product which costs 1 cent to manufacture, 3 cents to advertise and getting 10 cents for it, cannot be carried on. The purchasers are too keen to permit it.

More and more it is brought home to advertisers that it is necessary from the dollars and cents point of view to tell the truth. Exaggerated claims cannot be made good. Odious comparisons with competitive materials are considered in bad taste and seldom result in sales. The vigilance agencies of the advertising organizations have set up the slogan, "Truth in Advertising," and this proves that the profession has moved to the highest ethical standards. The combination of this rule with standardized and trade-marked materials, co-operation with manufacturers in simplifying the products made for public consumption, and the practice of fair competition is the work which the advertising business has set for itself. It is a fine useful work.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

BLOTCHY NICKEL DEPOSIT

To the Editor of THE METAL INDUSTRY:

With regard to Problem 3401 in your July issue, the small blotches, without a doubt, come from your anodes. Remove your anodes, scrape same with an old file in a pail of hot water; clean your anode hook and cathode rod. Also it is quicker to remove your solution. Hence, siphon same through a cheesecloth, then clean your tank; replace your solution and add to it 2 ozs. of single nickel salts per gallon; 3 to 4 ozs. sodium chloride per gallon; boric acid about 1 to 1½ lbs.

If you have a steam hose handy, you can steam up your solution a little. Be careful, and do not get it too hot for you will ruin the pitch lining of your tank.

Coldwater, Mich., ANDREW V. RE.
August 3, 1925.

PEELING NICKEL

To the Editor of THE METAL INDUSTRY:

I noticed Problem 3,416 in your August issue. I have been general foreman for over six years for a large company manufacturing plumbing supplies, and we have never had any goods peel. There is a lot in how the basin cocks, bibbs, etc., are treated before they enter the nickel tank. The film or tarnish does not matter so much except that the nickel solution should have a brightener in it. This will eliminate a lot of color buffing. Many elbows, tees, crosses, bibbs, etc., can be plated and made ready to ship without buffing.

Coldwater, Mich., ANDREW V. RE.
August 11, 1925.

APPRECIATION FROM HOME AND ABROAD

FROM NEW YORK

To the Editor of THE METAL INDUSTRY:

Enclosed find money-order for $1.00, one year subscription. I wish that every metal worker would subscribe to THE METAL INDUSTRY. It is a wonderful magazine and worth considerably more than the subscription price we are paying now.

I wish you a very successful year.

New York, FRANK BODUKY.
July 30, 1925.

FROM LONDON

To the Editor of THE METAL INDUSTRY:

We are very grateful to you for your letter and enclosure with regard to the nickel plating.

We much appreciate the lucid way in which your instructions are laid and we will carry them out to the letter.

London, England, HOWARD WALL LIMITED.
August 10, 1925.

FROM TOKYO

To the Editor of THE METAL INDUSTRY:

I acknowledge with thanks receipt of your valued favor and METAL INDUSTRY Vol. 21, Nos. 7 and 8.

Your courteous assistance in completing that volume will be remained in my own little library forever.

Osaki, Tokyo, Japan. KOZO TABATA.
July 10, 1925.

NEW BOOKS

Shop and Office Forms, Their Design and Use. By Wallace Clark. Published by McGraw-Hill Book Company, New York. Size 6 x 9, 134 pages. Price payable in advance $2.50. For sale by THE METAL INDUSTRY.

Forms are meant to simplify shop and office work and to make more effective the necessary methods of control. The author discusses the importance and the purposes of forms and goes into details of the methods of designing them, pointing out that simplicity is a prime requisite.

The book covers forms for different departments, such as, stores keeping, production, cost keeping, maintenance and inspection, sales, estimating and purchasing. Many examples are given from practical experience.

Health Maintenance in Industry. By J. D. Hackett. Published by A. W. Shaw Company, Chicago. Size 5½ x 8, 488 pages. Price payable in advance $5.00. For sale by THE METAL INDUSTRY.

Health is not only a personal asset but an industrial asset. It is as necessary to the firm employing a man as to the man himself. The author, who has had long experience in employment, personnel, and health work in industry, tells how to install and operate a medical department; the duties of the physicians and nurses; common ailments in industry, their prevention or reduction; occupational diseases, etc.

The book is written in a non-technical manner and will be very valuable to employers who contemplate installation of such a department or who already have one in operation.

Chemistry of Engineering Materials. By R. B. Leighou. Published by McGraw-Hill Book Company. Size 5½ x 8, 538 pages. Price payable in advance $4.00. For sale by THE METAL INDUSTRY.

This is second edition and a thorough revision of a book already in wide use. Dealing as it does to a considerable extent with fuels, corrosion, metals and metallic alloys, it should be of interest to those engaged in working with metals. The point of view is that of the engineer who specifies materials and must know the chemical properties of the substances which he is to use. A considerable amount of information is included on the production and methods of manufacture of these materials. Chapters of special interest are as follows: Fuels; Refractory Materials for Furnace Linings; Non-Ferrous Metals; Non-Ferrous Alloys; Corrosion on Iron and Steel; Foundry Sands; Lubricants, Glue.

Metallic Alloys. By G. H. Gulliver, Published by Chas. Griffin & Company. Size 5 x 7½, 439 pages. Price payable in advance $5.50. For sale by THE METAL INDUSTRY.

This is the fifth edition of an old standard work which is brought up to date from time to time. It covers the examination of metals in the laboratory, giving not only methods, but equipment and processes. Subjects covered are: Methods of Investigation; Physico-Chemical Equillibrium; Binary Alloys; Transformations in Solid Metals and Alloys; Structure of Metals and Alloys; Bronzes and Brasses; Ternary and More Complex Alloys; Effect of Rate of Cooling upon the Constitution of Binary Alloys.

Antimony. By C. Y. Wang. Published by Chas. Griffin & Company. Size 5½ x 8½, 217 pages. Price, payable in advance, $5.50. For sale by THE METAL INDUSTRY.

This is the standard book on antimony covering its history, chemistry, mineralogy, geology, metallurgy, uses, preparations, analysis, production and valuation.

These divisions of course, cover the subject from mining to the ultimate consumer. The book is too well known to need any detailed description as it is an indispensable part of every metallurgical library.

Alloys and Their Industrial Applications. By E. F. Law. Published by Chas. Griffin & Company. Size 5½ x 8½, 332 pages. Price, payable in advance, $6.00. For sale by THE METAL INDUSTRY.

This is the last edition of an old standard work which devotes more space to the practical mixing and alloying of metals than to their laboratory investigation.

The book is authoritative and is known as such. Topics covered are as follows: Properties of Alloys; Methods of Investigation; Constitution; Influence of Temperature on Properties; Corrosion; Bronze; Brass; German Silver (nickel-silver); White Metal Alloys; Anti-Friction Alloys; Aluminum Alloys; Silver and Gold; Miscellaneous Alloys.

Sheet Metal Workers Instructor. By R. H. Warn. Revised by J. G. Horner. Published by Crosby, Lockwood & Son. Size 5 x 7, 224 pages. Price, payable in advance, $2.50. For sale by THE METAL INDUSTRY.

The seventh edition of an old work is prepared by Mr. Horner, already known for his work on foundry practice. It is one of a series of Lockwood's trade manuals, and is written to aid the worker in sheet metals to design the various and complex forms necessary in sheet metail work.

The development of such forms on a flat sheet is of course, based on geometry and for that reason the first few chapters are devoted to that subject, and its ramifications. The remainder of the book deals with metals and their properties, methods of bending and forming sheet metals, joining and soldering. The tools and appliances used are also described. The book is full of practical problems with illustrations.

Chemical Coloring of Metals. By S. Field and S. R. Bonney. Published by D. Van Nostrand Company. Size 5 x 8½, 264 pages. Price, payable in advance, $4.00. For sale by THE METAL INDUSTRY.

The art of coloring metals has long been a mystery, known only to those who grew up in the industry. In recent years more has been published, however, and several books have appeared. This one is the latest and is welcome as the field is far from crowded. One of the authors, Mr. Field, already is known through his book on Principles of Electro-Deposition.

The book covers the following subjects: Chemistry; Action of Air on Metals; General Methods of Coloring; Mechanical Cleaning of Metals; Chemical Cleaning; Lacquering; Electro-Deposition; Coloring of Copper, Brass, Silver, Gold, Zinc, Nickel, Iron, Tin and Aluminum; Repair process, such as soldering, brazing, etc.

TECHNICAL PUBLICATIONS

Reduction of Zinc Oxide By Carbon. By G. A Zeller and B. M. O'Harra. School of Mines and Metallurgy, University of Missouri, Rolla, Mo.

In the first part of this paper the results obtained by the various investigators who have endeavored to determine the temperature at which the reduction of zinc oxide by carbon begins have been reviewed. It has been indicated that the best evidence points to about 800° C. as the temperature at which continuous reduction first becomes possibly under a pressure of one atmosphere, though it does not attain a readily detectable rate until considerably higher temperatures are reached.

In the second part of the paper an investigation of the effect of various factors upon the rate of reduction of zinc oxide by carbon has been described. It has been shown that at a temperature above that at which reduction of zinc first becomes easily noticeable the rate of reduction doubles with approximately equal intervals of temperature, the intervals differing for different forms of carbon. It has been shown that the gradual decrease in the rate of reduction during the distillation of a given charge is, in the cast of pure zinc ozide, not caused by any changes brought about in the zinc oxide itself by the prolonged heating causing it to be less easily reducible, but is a direct function of the amount of zinc remaining in the charge. The author's experiments showed little difference in the reducibility of different forms of pure or nearly pure zinc oxide, with the exception of that resulting from the calcination of the natural zinc carbonate, smithsonite, which was reduced much more rapidly than the other forms tested. Although the differences in reducibility were small, the forms of zinc oxide that had previously been heated to the highest temperature were, in general, reduced at the slowest rate. In all groups of experiments the variation in the rate of reduction with different forms of carbon was shown, at various temperatures and with various forms of zinc oxide. The authors have stated, as their opinion, that the differences in the rate of reduction of different forms of zinc oxide, and by different forms of carbon, are mainly due to differences in the surface condition of the zinc oxide or carbon particles, and that there are probably no very great differences in the temperatures at which reduction of the different varieties of zinc oxide, or by the different varieties of carbon, first begins; there is, however, no very convincing experimental evidence on this point.

Standards of the Hydraulic Society. The Hydraulic Society, 90 West street, New York City.

This booklet contains information including any earlier editions and in addition standard classification of pumps; standards nomenclature and definitions, pertaining to the industry; standard dimensions for cast iron flanges and cast iron flanged reducers for 125 lb. and 250 lb. steam pressure as adopted by the A. S. M. E., and a very complete list of chemicals and other special liquids, specifying the materials recommended in the construction of pumps for handling these special liquids.

Applications of X-Ray Spectrography and Crystallography to Metallurgy and to Chemical Problems. Adam Hilger, Ltd., 75a Camden Road, London, England.

The pamphlet is divided into four sections covering the following subjects: Section 1. Metallurgical and Analytical Applications of Spectroscopy; Section 2. Absorption Spectra and Spectrophotometry; Section 3. The Refractometer; Section 4. The Polarimeter.

GOVERNMENT PUBLICATIONS

Quicksilver in 1924. By Clyde P. Ross. U. S. Geological Survey, Washington, D. C.

Tin in 1924. By Bertrand Leroy Johnson. U. S. Geological Survey, Washington, D. C.

Fuller's Earth in 1924. By Jefferson Middleton. U. S. Geological Survey, Washington, D. C.

Bauxite and Aluminum in 1924. By James M. Hill. U. S. Geological Survey, Washington, D. C.

Terneplate. Simplified Practice Recommendation No. 30. Bureau of Standards, Washington, D. C.

Cadmium in 1923-1924. By C. E. Siebenthal and A. Stoll. U. S. Geological Survey, Washington, D. C.

Milling Cutters. Simplified Practice. Recommendation No. 36. Department of Commerce, Washington, D. C.

Directory of Trade Schools. Bulletin No. 99. Federal Board for Vocational Education, Washington, D. C.

Hot Water Storage Tanks. Simplified Practice Recommendation No. 25. Bureau of Standards, Washington, D. C.

Production of Metals from Secondary Sources in 1924, by J. P. Dunlop, U. S. Geological Survey, Washington, D. C.

Wiping Cloths. Federal Specifications, Specification No. 260. Circular No. 267. Bureau of Standards, Washington, D. C.

Wire Rope. Federal Specifications Board, Specification No. 297. Circular No. 208. Bureau of Standards, Washington, D. C.

Flax Packing. Federal Specifications Board, Specification No. 101a. Circular No. 239. Bureau of Standards, Washington, D. C.

Statistics of the Copper Industry in the United States in 1923 and 1924, by H. M. Meyer, U. S. Geological Survey, Washington, D. C.

Cloth Insertion Rubber Packing. Federal Specifications Board, Specification No. 110a. Circular No. 236. Bureau of Standards, Washington, D. C.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

BLUING AND ZINCING NAILS

Q.—I would like to ask you for information on the best method of bluing nails. Also the best method of what is termed Drum Galvanizing of nails. The nails are put in the drum and so much zinc per keg. I have trouble sometimes in not getting smooth nails; also some come out dark.

A.—Iron or steel nails can be blued by tumbling in a steel drum over a coke fire or Bunsen gas flame along the lines that you now use in galvanizing nails. The temperature must be controlled or a close watch kept during the bluing operation to maintain a uniform color. Chemically, you can blue the nails in a mixture of equal parts of sodium nitrate and sodium nitrite heated in an iron pot to 550° F. The cleansed and dry nails are placed in perforated iron ladles holding a number of pounds. The ladle is then immersed in the molten mixture until blue. The nails should be then cooled in cold water and finally dried out.

Galvanizing Steel Nails: Unfortunately you give us no data as to the methods used in galvanizing the nails other than that so much zinc is used per keg of nails. This information is very indefinite. Do you use a concentrated flux consisting of zinc chloride and sal-ammoniac equal parts dissolved in warm water to immerse the nails in the flux before galvanizing? If not, try this method. Melt the zinc in the drum first with a little coarse gray sal-ammoniac before placing the nails in the drum. Preheat the nails to about 400° F. before placing them in the drum. If the nails are put into the drum with the zinc while cold, then it is advisable to put a small amount of gray sal-ammoniac in with the charge to act as a flux and reduce the formation of dross to a minimum.—C. H. P. Problem 3,428.

CHOCOLATE BROWN

Q.—I am interested in plating and coloring metals, and expect to have some work very soon to receive the finish called chocolate brown. The solution used for this finish contains barium sulphide, yellow, potassium sulphate, ammonium chloride, copper acetate, potassium hydroxide, either sulphuric or nitric acid and water. Will you please give me the information concerning the chemicals to be used and the quantity of each in order to enable me to produce the chocolate brown finish?

A.—To produce a satisfactory chocolate bronze finish on basic metals other than solid copper, it is necessary to copper plate the surface by the aid of an acid copper sulphate solution. Such a solution may be prepared on the following basis: Water, 1 gallon; copper sulphate, 24 to 28 ozs.; sulphuric acid 60°, 4 to 6 ozs.; aluminum sulphate, 1 to 2 ozs.; Temp. normal; voltage, 2; anodes of soft sheet copper.

It is not necessary to deposit a very thick coat of copper. All that is required is a uniform deposit. After scratch brushing the copper-plated surface, any of the following combinations may be used to produce the chocolate bronze.

Water, 1 gallon; copper sulphate, 4 ozs.; nickel sulphate, 2 ozs.; temp. 180° F.

Water, 1 gallon; barium sulphide, ¼ oz. or as may be required to give the color desired; temp. 180° F.

Water, 1 gallon; hydrosulphuret of ammonium, 1 fluid oz.; temp. normal.

After the articles have been immersed in the bronzing dip, wash thoroughly in cold and hot water and dry out in maplewood sawdust. Scratch brush the bronze surface dry. Use a soft crimped brass wire scratch brush for the purpose. You will then be able to decide whether it is necessary to repeat the operations or increase the strength of the solutions to meet your requirements. Any of the factors you mention can be used separately to give bronze tones but not collectively. Potassium hydroxide, which is caustic potash, can be used with barium sulphide or sulphuret of potassium about 4 ozs. of the caustic potash per gallon of hot water; the barium sulphide and sulphuret of potassium to be added to produce the bronze tone desired. Ammonium chloride and copper acetate dissolved in hot water is sometimes used to produce bronze tones on copper. The combination practically produces an ammonia copper black solution. It might answer your purpose. Try equal proportions per gallon of hot water, starting with 1 oz. each per gallon.—C. H. P. Problem 3,429.

CONTROL OF NICKEL SOLUTION

Q.—In Platers' Wrinkles there are terms used that I do not understand. What is single sulphate of nickel? Are sulphate of nickel and nickel salts the same? My solution contains about 250 gallons. We use as an acid, nickel salts and sometimes have to add sulphuric; why, I don't know. As an alkali we use strong ammonia. The only thing that worries me is the solution going down and not being able to build it back to proper standing. I use litmus paper for testing.

A.—1. Single sulphate of nickel is commonly termed single nickel salts. It contains approximately 22 per cent nickel as metal, the balance sulphuric acid and the water of crystallization 22 per cent. Metal is equal to 3½ ozs. of metallic nickel in every pound of single nickel salts. Double nickel salts are a chemical combination of sulphate of nickel and sulphate of ammonia. They contain only 14 per cent nickel as metal or 2¼ oz. of metallic nickel in every pound of double nickel salts. Single nickel salts are five times more soluble in hot water than double nickel salts, and are universally used. To keep up your nickel solution to a definite standard, secure a Baume hydrometer from any platers' supply house.

Test out your solution with the Baume hydrometer and note its density by the scale printed in degrees. Presuming the nickel solution registers 8 or 10 and is giving good results, then aim to keep the density or strength about the same. Always add pure clean water to the solution each night to maintain the original level of the solution in the tank. Add about 1/16 oz. of glacial acetic acid per gallon of solution about twice a week. Do not add sulphuric acid or ammonia. Keep constant note of its strength by the aid of the Baume hydrometer. If it remains constant, make no further additions. If the strength goes down, then add sufficient concentrated nickel solution to bring it back to its original density or strength, prepared as follows: Water, 5 gallons; single nickel salts, 10 lbs.; nickel chloride, 2½ lbs.; boracic acid, 1 lb.; temperature 180° F. Make the replenishing additions at the close of the day's work. Stir the solution thoroughly and then test it out. If you follow these instructions, you can maintain your nickel solutions constant.—C. H. P. Problem 3,430.

GREEN ON COPPER

Q.—Kindly send us a solution for a green finish on copper for outside use.

A.—Possibly for your purpose the following method of applying a green finish to copper will be satisfactory. First cleanse the copper; darken if desired with a dilute solution of liver of sulphur of polysulphide; then apply a thin coat of French varnish or a varnish lacquer. When dry, apply copper carbonate or chrome greens mixed with a small amount of turpentine and copal varnish. Use but little varnish. It is best to apply the color with a painter's sash brush and give a stippling motion to the brush.

When the green tone is dry and hard, brush up with a soft bristle brush to which is applied a small amount of beeswax. The finish will then be atmosphere proof.

A chemical verde green can be prepared as follows: Water, 3 quarts; muriatic acid, 1 quart; verdigris, 3 lbs.; copper carbonate, ½ lb.; white arsenic, ½ lb.; sal-ammoniac, 3 lbs. To prepare, dissolve the arsenic in the acid by the aid of heat, then mix with the water; add the verdigris copper carbonate and sal-ammoniac in the order given. Apply with a brush; when dry and hard apply a little beeswax; polish; rub up with a soft cloth. This finish will be atmosphere proof.—C. H. P. Problem 3,431.

HOT ZINC ON PIPE FITTING

Q.—We galvanize pipe fittings by the hot dip process in an open steel pot 7 ft. long, 2½ ft. wide and 3 ft. deep, metal melted by coke fire, using steel wire screen baskets to immerse fittings in molten spelter. The majority of fittings galvanized range in size from ½ in. to 2 in.

Will you kindly advise us what proportions of sal-ammoniac do you figure we should use per ton of fittings galvanized; also what proportion of zinc used should there be of dross? We dross once a week.

A.—The record we have given by one of the largest companies, taken from their records of daily practice show the proportion of sal-ammoniac per ton of fittings galvanized, 22 lbs.; dross, 127 lbs. per ton of fittings galvanized; and 1 lb. of zinc will galvanize about 7½ lbs. of fittings. The dross will average about 40% of zinc used.—W. J. R. Problem 3,432.

LEAD COATING WIRE

Q.—We have a job of wire-forming, the product being lead-coated. We know almost nothing about this business, so any information you can give us as to materials, methods and equipment will be more than appreciated. The product is made of bright basic steel. It is to be lead coated after forming. We have no equipment or facilities of any kind for electro-plating the lead on the formed wire surface, which is to be used in connection with storage batteries.

A.—The coating of iron or steel articles with lead by the molten process is more difficult than coating similar products with tin or zinc. For the molten lead process the following manipulations should be adhered to.

1. The articles to be lead coated should be free from surface scale or oxide and tumbled clean and bright.

2. The preliminary cleansed surfaces should be finally cleaned with a hot alkaline cleaner. (See advertisements in THE METAL INDUSTRY for such cleaners.) Follow up with washing in cold water, then immerse in a pickle for a moment or two, consisting of equal parts of muriatic acid and water. Re-wash in water and immerse the articles in the following mercury dip. Water, 1 gallon; mercuric chloride, 4 ozs.; nitric acid, 1/16 oz. Agitate the articles while in the mercury solution so that a thin deposit of metallic mercury will result; then wash thoroughly in water.

3. Immerse in a dip composed of water 1 gallon, sal-ammoniac 2 lbs. Immerse for a moment, then drain quickly and immerse in the molten lead direct.

4. As soon as the articles are coated with the lead, plunge into hot water containing a little sal-ammoniac, then re-wash in hot water. This completes the hot lead process. Lead pots for molten lead can be purchased from dealers in such products. The various dips can be maintained in lead-lined tanks made of cypress wood. The seams should be burned in.

The electro-lead process is used extensively by manufacturers of storage batteries. One large firm in Cleveland uses the process and many other firms also use the process. The method consists of electro depositing the lead from a fluosilicate lead solution, which can be purchased from the U. S. Lead and Refining Company, East Chicago, Ind. The solution so purchased may be used undiluted with the addition of 1 oz. black molasses per gallon of solution or the solution may be reduced ⅓ to 50% with water. Heavy sheet lead must be used as anodes.

Plating Room Equipment.

We have no idea just how many parts you anticipate plating per day, so are unable to give you an idea of the equipment required. We submit the following as an outline.

1 motor-generator set 5 to 6 volts; 500 amperes, direct connected.

1 plating tank 250 to 500 gallon capacity, wood lined with lead coated with asphaltum; rod connections, generator cables, etc.

1 voltmeter; 1 rheostat 250 to 500 amperes capacity.

1 steel tank for cleaning purposes, steam-heated 100 to 200 gallon capacity.

1 wooden tank for cold water, connected with running water, same capacity as above.

1 wooden tank for hot water as above.

1 small tank, lead lined for acid pickles.

Frames to hold product while lead plating, work benches, etc.

Plating supply houses can give estimates on the equipment. It may be necessary to install a small copper plating solution to give a basis deposit to the steel before lead plating.—C. H. P. Problem 3,433.

NICKEL ON CHROME STEEL

Q.—We are sending you under separate cover, two screws which I understand are made of high chrome steel. We have trouble in blistering in our cyanide copper solution, and when nickel plated direct gives us trouble in peeling. We have a copper solution made up of 4½ ozs. sodium cyanide, 4 ozs. copper cyanide and ½ oz. bisulphite of soda. On plating radiator shells the copper has a wavy appearance after buffing. Is the solution correct?

A.—It should not be any more difficult to nickel plate chrome steel than it should a high carbon or case hardened steel set screw. Possibly the trouble results from the solution. We suggest the following:

Nickel solution: Water, 1 gallon; Epsom salts, 12 ozs.; single nickel salts, 12 ozs.; boric acid, 2 ozs; sal-ammoniac, 2 ozs.; glacial acetic acid, 1 oz. This solution will produce a very heavy deposit. As a final acid dip for the chrome steel set screws before plating, try either of the following acid dips. Water, 1 gallon; sulphuric acid, 16 ozs.; common salt, 4 ozs.; temp. 120° F. Sulphuric acid, 2 quarts; nitric acid, 1 quart; water, 1 quart.

Copper solution: Water, 1 gallon; sodium cyanide 96-98%, 5 ozs.; copper cyanide, 4 ozs.; bisulphite of soda, 1½ ozs.; caustic soda 73-76%, ½ oz.; hyposulphite of soda, 5 grains, or 1 oz. per 100 gallons of solution. Temp. of solution 120° F. Voltage 4 to 6. Change your solution with necessary additions accordingly. Mechanical agitation of the cathode or work rods is always advantageous. Filtration removes any insoluble matter and results in a cleaner solution.—C. H. P. Problem 3,434.

NICKEL ON ETCHED BRASS

Q.—We would like information about brass strip deeply etched. The nickel flows on freely but the etching takes considerable time to become white. Are there any methods that you know of in which I may dip this before polishing that will help the etching to plate more rapidly?

A.—Why not try a thin deposit of copper on the deeply etched brass strips before nickel plating. The nickel will readily cover over the copper. A dilute copper solution could be prepared as follows: Water, 1 gallon; sodium cyanide, 2 ozs.; copper cyanide, 1½ oz.; bisulphite of soda, ½ oz.; caustic soda, ½ oz.; hyposulphite of soda, 2 grains. If possible, use the copper solution at 140° F. You might try the following acid dip if you cannot copper plate the etched brass strip. Sulphuric acid, 1 gallon; nitric acid, 1 quart; water, 1 quart. The dip should be used cold. Immerse for a moment only, then wash thoroughly in cold water; follow up with a cyanide dip; re-wash in water and nickel plate as usual. The acid dip can be used before polishing the brass strip if so desired; dry out thoroughly before polishing.—C. H. P. Problem 3,435.

NICKEL ON HARD RUBBER

Q.—Kindly send me a formula for nickel plating hard rubber. I want to plate directly in the nickel solution without copper plating.

A.—To nickel plate hard rubber successfully, it is necessary to metallize the surface first. This can be accomplished by applying copper bronze powder mixed with a celluloid lacquer or a mixture of copper bronze and air floated Ceylon graphite. A method quite frequently used in applying the copper bronze powder or graphite, is to soften up the surface of the hard rubber with such solvents as benzole or carbon-tetrachloride or carbon bisulphide. Just as soon as the surface of the rubber becomes tacky, any of the metallizing factors mentioned should be applied dry and rubbed into the rubber surface thoroughly. When dry the rubber may be plated directly in the nickel solution. The nickel solution should contain more metal than a solution used for ordinary nickel plating used cold. We suggest the following: Water, 1 gallon; Epsom salts, 12 ozs.; single nickel salts, 16 ozs.; boric acid, 2 ozs.; ammonium chloride, 2 ozs.; acetic acid, ⅛ oz.; sodium perborate, 1/15 oz. The latter material should be dissolved separately in warm water, afterwards stirring it into the nickel solution.—C. H. P. Problem 3,436.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,543,657. June 23, 1925. **Mold.** Charles B. Bohn and Daniel Frown, Detroit, Mich., assignors, by mesne assignments to Bohn Aluminum & Brass Corporation, Detroit, Mich., a corporation of Michigan.

A mold for forming chambered castings of low melting point metal, said mold having a cavity with sections forming the bottom walls of the casting (as it lies in the mold), sections forming the top walls of the casting and interconnecting sections extending upward from the bottom wall sections to the top wall sections to form inter-connecting parts of the casting.

1,543,695. June 30, 1925. **Brass-Melting Furnace.** Ora A. Colby, Irwin, Pa., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvana.

An electric resistance furnace comprising a plurality of radially extending, relatively thin, flat, refractory resister plates, located in a substantially circular path, and a plurality of rfractory terminal members, of wedge shape, interposed between certain of said plates and symmetrically spaced circumferentially thereof.

1,543,861. June 30, 1925. **Method of and Apparatus for Producing Copper Sheets Eletrolytically.** William W. McCord, Wyandotte, Mich., assignor to McCord Radiator & Manufacturing Company, Detroit, Mich., a corporation of Maine.

The process of maintaining a substantially constant percentage of metallic content in the electrolyte of an electrolytic apparatus, consisting in circulating the electrolyte through a plurality of connected electro-depositing units and supplying only certain of the units with metal stock so that the excess metallic content produced in such units will be deposited out in the units not supplied with metal stock.

1,543,921. June 30, 1925. **Metallic Alloy.** Bert Mace Huff, Detroit, Mich., assignor of one-third to Harold A. Arnold, Detroit, Mich., and one-third to Maurice E. Fitzgerald, Pontiac, Mich.

A metallic alloy containing as the principal ingredient substantial amounts of cobalt, chromium and tungsten totaling not less than 70 per cent together with relatively small amounts of manganese and silicon, the cobalt not exceeding 50 per cent, the chromium not exceeding 35 per cent and the tungsten not exceeding 15 per cent.

1,544,027. June 30, 1925. **Plating Device.** John J. Mueller, Jr., Ottawa, Ill.

A device of the character described comprising an electroplating bath having an anode, means for conveying portions of a strip to be plated through said bath, and electrically controlled means for guiding said strip in a substantially straight path through said bath.

1,544,036. June 30, 1925. **Nickel-Chromium Alloy and Process of Making Same.** Milton J. Rosencrantz, New York, N. Y.

A process of making a nickel-chromium alloy comprising melting nickel and chromium and a previously formed nickel-chromium alloy which has been treated with zirconium while in a molten state.

1,544,037. June 30, 1925. **Nickel-Chromium Alloy and Process of Making Same.** Milton John Rosencratz, New York, N. Y.

A process of making a nickel-chromium alloy, comprising melting nickel and chromium, and introducing zirconium into the melt.

1,544,108. June 30, 1925. **Process of Making Bronze.** Henry H. Smith, Berwyn, Pa., assignor of one-half to Anna H. Smith, Berwyn, Pa.

A method of making bronze which consists in fusing approximately 40 parts tin, 10 parts zinc and 1 part phosphor copper to produce a foundation metal, using approximately 306 parts copper, raising the temperature of the copper to approximately 2,200 degrees and fusing the foundation metal with the copper.

1,544,188. June 30, 1925. **Plating Barrel.** John W. Slattery, Bridgeport, Conn., assignor to The Cornwall & Patterson Manufacturing Company, Bridgeport,, Conn., a corporation of Connecticut.

In a plating barrel, a rotatable container for the articles to be plated, said container comprising insulating walls having openings therein, a plurality of separate, spaced bar conductors extending longitudinally of the container adjacent the inside walls thereof.

1,544,451. June 30, 1925. **Electrodeposition of Chromium.** Carl Hambuechen, Mount Vernon, N. Y., assignor to Electro Metallurgical Company, a corporation of West Virginia.

A bath for electrodepositing chromium, containing chromic acid in excess and a soluble metal fluorid, and being substantially free from acids other than chromic.

1,544,605. July 7, 1925. **Electrodeposition of Metals.** Harry A. Sedgwick and Patrick J. Sheehan, Milwaukee, Wis.

In a method of electrodeposition of metals, the step which comprises reduction of the electrical resistance of the electrolyte by conserving therein practically the total quantity of heat generated as a result of passage of current there-through.

1,544,710. July 7, 1925. **Casting Magnesium.** Odin Wilhelmy, Cleveland, Ohio, assignor to American Magnesium Corporation, Niagara Falls, N. Y., a corporation of New York.

The process of making a casting of magnesium which comprises forming a core from sand with a binder containing water glass, substantially dehydrating the water glass and casting molten magnesium in a mold around said core.

1,544,735. July 7, 1925. **Liquid Metal Cleaner.** Mina W. Gleeson, Chicago, Ill.

A cleaning and polishing compound consisting of carbon tetrachloride, paraffin oil, and rottenstone.

1,544,929. July 7, 1925. **Method of Casting.** Charles Pack, Elmhurst, N. Y., assignor to Doehler Die-Casting Company, a corporation of New York.

The method of making castings having an internal undercut consisting in forming a core of a metal soluble in an acid, casting about the core a metal insoluble in the acid, and then dissolving the core in said acid.

1,544,930. July 7, 1925. **Method of Casting.** Charles Pack, Elmhurst, N. Y., assignor to Doehler Die-Casting Company, a corporation of New York.

The method of making castings with an internal undercut consiting in casting directly upon a suitably shaped metal core, a metal at a temperature which is above the fusing point of the core but below that which will supply sufficient heat to the core to raise its surface to the fusing point, allowing the casting to set, and then removing the core.

1,545,032. July 7, 1925. **Process of Recovering Silver.** Russell Born, Edgewood, Pa.

A process of recovering silver from solutions containing silver thiosulphate, which comprises the treatment of the said solution with a soluble sulphide, constantl maintaining the solution alkaline.

1,545,112. July 7, 1925. **Alloy.** James Osborne Wilson, Toronto, Ontario, Canada.

An alloy of metals comprising one thousand and ninety to eleven hundred and fifty parts of copper, two hundred and eighty to three hundred and twenty parts of nickel, four hundred and seventy-five to five hundred and fifty parts of zinc, four to ten pounds of boron, eighteen to twenty-two parts of tin, twenty to thirty-five parts of manganese, fifty-five to sixty-five parts of lead, and one quarter part to one part of phosphorus.

1,545,127. July 7, 1925. **Method of Producing Copper-Coated Metallic Articles.** Roy H. Christ, Bethlehem, Pa.

The method of producing copper coated materials or article consisting in forming an alloy of ferrous material and copper, heating the alloy above 1100° F., in an oxidizing atmosphere and cooling the same.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

QUICK-LOADING SAND-BLAST BARREL

A new sand-blast barrel soon to be made by the Pangborn Corporation of Hagerstown, Md. is said to have some features that are essentially new to this type of equipment. Foundrymen have long recognized that the action of the sand-blast barrel is intermittent, due to loss of time in loading and unloading the barrel charges. This factor is largely eliminated in this new barrel. A full charge of 16 cu. ft. is loaded from the floor in 35 seconds by the automatic loading device. A large door opening in the drum accommodates a steel skip, raised by trolley or crane, traveling in guides on the front of the barrel to dumping position.

The clearance beneath the barrel is sufficient to receive a receptacle large enough also to contain the entire barrel charge, and the interior of the barrel is so designed that the entire load is dumped by simply rotating the barrel.

The capacity of the sand-blast tank is 5,000 lbs. of sand or 12,500 lbs. of steel abrasive, sufficient to clean more than the average load. This permits refilling the sand-blast tank while the barrel itself is being loaded and unloaded, giving practically continuous operation. Complete unloading and loading of the barrel, and refilling the sand-blast machine "from charge to charge" is said to be accomplished in five minutes or less.

The machine uses either sand or steel abrasive without change or adjustment and an abrasive separator and cleaner is provided that delivers only thoroughly clean abrasive to the machine for reuse.

To meet the growing demand for direct motor drive equipment, a complete enclosed gear reduction drive made integral with the barrel, is interchangeable with the standard belt drive.

Several of the barrels are now in use in various foundry operations and it will be exhibited at the Syracuse Convention.

QUICK-LOADING BARREL

MOLDING MACHINE

The Milwaukee Foundry Equipment Company, Milwaukee, Wis., is making a molding machine, designated as their No. 12 Milwaukee Jolt Squeezing Stripper, which, it is claimed, produces a completely machine made mold. It is a combination of their No. 10 Squeezer and No. 11 Jolt Stripper.

MILWAUKEE NO. 12 JOLT SQUEEZING STRIPPER

On work where heads and risers do not interfere, this machine performs the butting off operation as well as jolting and stripping, thus producing the completely machine made mold.

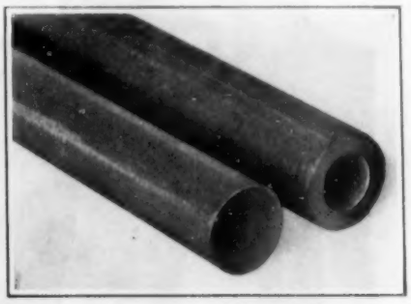
The frame and arm of this machine are of cast steel. The arm support which insures a rigid platen and an even squeeze is a feature of Milwaukee molding machines. This type of pressure it is claimed, head reduces air consumption to a minimum and does not interference with flask handles or trunions. Dimensions are:

Pattern Draw	5 in.
Jolt Piston Diameter	5 in.
Squeeze Piston Diameter	10 in
Lifting Capacity	500 lbs.
Maximum Pattern Length	24 in.
Maximum Pattern Width	13½ in.
Height from floor to table	31 in.
Floor Space	7 ft.
Shipping Weight Crated Approximately	1,200 lbs.
Free air per mold Approximately	4 cu. ft.
Table Size	16 in. by 26 in.

NEW BEARING METAL

A new bearing material known as Crilly-Mercury metal is being marketed by the Metal Sales Company, Jersey City, N. J.

Mercury Metal is said to be a close grained alloy of great density, guaranteed not to grip, burn or score should lubrication fail in the bearing. It is not a graphite impregnated metal.



CRILLY-MERCURY METAL BARS

Compression strength is 92,000 pounds; tensile strength is approximately 23,500 pounds. It is claimed that it will stand the most severe shocks and, even when run entirely dry under the most extreme loads, it doesn't grip, burn or score. It can be used wherever plain bearings are used.

Crilly mercury bearing metal is distributed in solid and cored bar form. The solid bars range from ¾ inch to 6 inches in diameter, and the cored bars from 1 inch to 6 inches with various sized cores. The standard length is 12 inches, but longer bars can be supplied to order. Special shapes and casting are also made to order.

NEW FUEL OIL STRAINER

HAUSFELD OIL STRAINER

A source of a great deal of annoyance to foundrymen and others using oil fuel is the fact that the spray nozzle of the burners is easily clogged and the flow of oil interrupted. Consequently a numbers of strainers have been put on the market to take care of this difficulty.

The Hausfeld Kant-Clog Strainer has been designed and developed by the Campbell-Hausfeld Company of Harrison, Ohio, to eliminate the interruption of the flow of the oil to the furnace and to provide a means by which the strainer can be cleaned without interrupting the flow of oil. It consists of a jacket with a circular strainer on the inside containing approximately 10 square inches of strainer surface. The perforations in this strainer are small enough so that any particles passing through the strainer will pass through the spray nozzle.

In case the oil contains a large quantity of foreign matter the plunger, which has an agitator that works over the outside surface of the strainer, is pushed up or down one or two strokes and cleans the strainer. On the bottom of the jacket there is a large plug which is in direct connection with a reservoir into which the sediment and dirt cleaned from the strainer settles. This plug can be readily removed and the strainer cleaned during the noon hour or in the morning before operation commences.

The low cost of this strainer, it is claimed, makes it a very practical addition to any oil burning furnace. The time saved pays for the strainer in a very short time. The pipe connections on the strainer are for ¼ inch iron pipe;; capacity, 150 gallons of oil per hour.

The Campbell-Hausfeld Company is well known to foundries and smelters through its metal melting furnaces, and developed this strainer as an accessory to its own line. However, this strainer can be set in the line to any oil burner on any furnace, and its capacity is sufficient to take care of almost any general conditions.

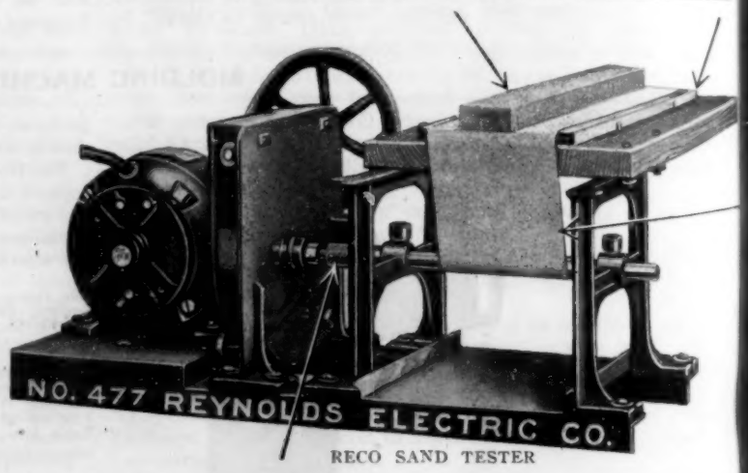
SAND TESTER

The Reco Sand Tester is specially designed for testing the cohesiveness of molding sand. The sand test bar is rammed on a piece of waxed paper placed on the bottom plate, one end of the paper arranged to hang over for some distance. The core plate is then placed on the platform and the overhanging end of paper is inserted in the slot in the shaft and the motor started. As the paper winds up the core is pulled forward at slow speed until the overhanging end of core breaks off; this is caught in a tray and weighed.

The shaft is provided with a special coupling by which it may be disconnected from the driving mechanism and the paper unrolled.

Motor is made in all commercial voltages and frequencies and can be run from the ordinary lighting circuit. Ten foot flexible cord and attachment plug is included.

This tester is made by the Reynolds Electric Company, Chicago, Ill.



RECO SAND TESTER

GAS FURNACES

JOHNSON GAS FURNACES NO. 20 AND NO. 400

The Johnson Gas Appliance Company, Cedar Rapids, Iowa, has added two new sizes to its line of melting furnaces, No. 20, for 50 lbs. of lead and No. 400 for 600 lbs. of lead. Dimensions of these furnaces are as follows:

	No. 20	No. 400
Height	18 in.	31 in.
Weight	36 lbs.	345 lbs.
Diameter	7 in.	16 in.
Depth	5 in.	10 in.
Gas Consumption, per hour	35 cu. ft.	240 cu. ft.
Capacity	50 lbs.	600 lbs

Both furnaces have a removable cast iron pot and lid. They do not require forced air blast.

CORE BINDER

The Charles A. Krause Milling Company of Milwaukee, Wis., is marketing a core and facing binder for foundries known as the Tux core and facing binder. It is guaranteed to be of high weight and binding strength, and is said to be made in such quantities as to be low in price.

PORTABLE PYROMETER

USING THE PYRO-LANCE

The Pyro-Lance is a portable pyrometer for molten brass and aluminum, made by the Illinois Testing Laboratories, Chicago, Ill. The first instrument was put out about four years ago and subsequently several more were placed in service with the sole object of determining the best possible arrangement of the various elements to form an instrument not only convenient but extremely sturdy to withstand the hardships encountered in most foundries. About six months ago it was found that the instrument was ready for the market.

The instrument is self-contained, combining under one housing the pyrometer, leads and the thermo-couple, thus eliminating one source of continual trouble experienced with the use of pyrometers. This trouble is the inconvenience of carrying the connecting leads between the couple and the meter. Furthermore, since these leads are lying on the floor they occasionally come in contact with the drippings of hot metal and as a result the insulation is prematurely destroyed, causing the meter to become inoperative. Furthermore, the connecting wires have been a source of grief in that on many occasions these wires become loose at the various connecting points, resulting in inaccurate readings.

The Pyro-Lance, it is claimed, eliminates these troubles and since it weighs but a few pounds, can be carried about with ease. To operate the instrument it is only necessary to dip the fire end partly into the molten metal and almost instantly the temperature is shown on the instrument dial.

Due to the liberal use of dies, tools and fixtures the manufacturers claim to be able to manufacture this instrument at a cost which is a fraction of that of the regular pyrometers. Also due to their using part of this same instrument for another purpose they are producing these units in relatively large quantities, cutting manufacturing costs.

ZELLAC FOR AUTOMOBILES

A high-pressure and concentrated merchandising campaign has been inaugurated by the Zeller Lacquer Manufacturing Company of New York for the introduction of their new product, Auto Zellac, to the Chicago area of the motor car trade and motoring public. The Chicago metropolitan district and nearby towns have been chosen to start action in this territory. Motor car dealers, paint shops, and other dealers interested in refinishing of cars, as well as a number of motor car manufacturers who have either adopted Auto Zellac as standard equipment or are contemplating doing so, have been important factors in the launching of the Zellac Lacquer Manufacturing Company's drive.

"We have taken this new step in the distribution of our products," said Mr. Hugo Zeller, president of the company, "because the time has come when lacquer as a finish for motor cars is scientifically established. There is no question about the advantages of lacquer. A good lacquer finish should last three years or more with no re-varnishing or other attempts to preserve its hard and lustrous surface. There will be no flaw in the finishing of his entire car; it will require no special care after application; it is applied in ninety-six hours; and a lacquer finish cuts a third off the natural depreciation of his car."

Other manufacturers of lacquer products have lately been agitating these points, and it is surmised in some trade quarters that lacquer men are coming out full strength during the next year in their drive for a more extensive use of lacquer by motor car makers, re-finishers and even among motorists themselves.

NEW "NO-DUST" DRYING MACHINE

The Blake & Johnson Company, Waterbury, Conn., is placing on the market a new drying machine for metal parts.

This illustration shows the receiving end and one side of the latest model of the No-Dust Automatic Dryer. In addition to embodying all the No-Dust patented features which have been in use for several years, this machine embodies patented improvements, such as the baffle plate which guides the hot air through the steam coils and the so-called "damp box" which takes a large portion of the moisture from the work before it reaches the main part of the dryer. This "damp box" is said to be one of the most essential points in the automatic drying of metal parts.

The work to be dried is thrown into the hopper which feeds it into a slowly revolving cylinder, through which it is carried by means of a helix and is finally discharged at the opposite end. The cylinder is perforated to allow the circulation of the hot air which is drawn through a steam coil by an exhaust placed on the right side of the machine, and which forces the air through the center of the revolving cylinder and thence through suitable vents directly onto the work as it is slowly turned and carried forward through the cylinder.

The work is constantly acted upon by the hot air for the entire length of the cylinder, and a large portion of the moisture is removed in the "damp box" in the front part of the machine before the work enters the second compartment, where any remaining moisture is quickly and completely evaporated and wiped off by the hot air blast, thus eliminating stains if the work is thoroughly cleaned.

The standard 8-D-2 Dryer shown has a cylinder 20" diameter and will handle most parts up to 4" diameter. A larger dryer having a 30" cylinder will handle parts up to 8" diameter. The cylinder head at the receiving end is made with an adjustable opening to regulate the amount of work fed into the cylinder. the revolving cylinder, a belt machine, will handle baskets or racks of work or individual parts placed on the conveyor belt.

It is claimed that these No-Dust Dryers entirely eliminate the use of sawdust or other drying material and due to their automatic operation cut the cost of labor in many instances from fifty to seventy-five per cent.

NO-DUST AUTOMATIC DRYER

EQUIPMENT AND SUPPLY CATALOGS

Sheet Lead. Hoyt Metal Company, St. Louis, Mo.

Protection for Metals. Vacuum Can Company, Chicago, Ill.

Forging Machinery. National Machinery Company, Tiffin, Ohio.

Combustion Engineering Service. A. R. Spencer, Cleveland, Ohio.

Underfeed Stokers. Detroit Stoker Company, Detroit, Mich.

"Stable-Arc" Welder. Lincoln Electric Company, Cleveland, Ohio.

Scientific Washing. Cowles Detergent Company, Cleveland, Ohio.

Strip Metal Reels. The Blake & Johnson Company, Waterbury, Conn.

Grinding Machines. U. S. Electrical Tool Company, Cincinnati, Ohio.

Metal Melting Furnaces. Campbell-Hausfeld Company, Harrison, Ohio.

Rockwell Dilatometer. The Stanley P. Rockwell Company, Hartford, Conn.

Testing Machines. Riehle Bros. Testing Machine Company, Philadelphia, Pa.

Tendencies in Sales Organization. Metropolitan Life Insurance Company, New York.

Blocks for Winding Wire and Strip Metal. Blake & Johnson Company, Waterbury, Conn.

Enamel, Equipment, Materials and Supplies. Ferro Enamel Supply Company, Cleveland, Ohio.

Portable Air Tools. Two folders and a catalog. Buckeye Portable Tool Company, Dayton, Ohia.

Electrical Level and Pressure Indicator and Recorder. Republic Flow Meters Company, Chicago, Ill.

The **Welder's Guide.** Information on welding of various metals. Steel Sales Corporation, Chicago, Ill.

Plan Book of Industrial Lighting Activity. Industrial Lighting Committee, National Electric Light Association, New York.

Felt Wheels and Sheet Felts. Walter C. Gold, Philadelphia, representing the Eastern Felt Company, Winchester, Mass., in Philadelphia, Pa., Camden, N. J., and Reading, Pa. A catalog for manufacturers of dental and jewelry products, and numerous others.

Use and Treatment of Glue for Polishing. B. H. Divine, Divine Brothers, Utica, N. Y. A booklet covering the history of glue, purchasing and selection; colors; bending-tests; forms; storage; preparation; soaking; melting; cleanliness; application; atmospheric conditions; glue room control.

G. I. A. Grinding Discs, Three-M-ite and "Netbac" Discs. Walter C. Gold, Philadelphia, Pa., who represents the Gardner Machine Company, of Beloit, Wis., manufacturers of G. I. A. and "Netbac" Discs in South Eastern Penna., Southern New Jersey, Delaware, Maryland, Washington, D. C., and Virginia.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

BRITISH INSTITUTE OF METALS

HEADQUARTERS, 36 VICTORIA ST., S. W. 1, LONDON, ENGLAND

The autumn meeting of the Institute will be held in Glasgow from September 1 to 4, 1925. Papers to be read are as follows:

Anderson, Robert J., B.Sc., Met.E., (Boston, Mass., U. S. A.) and Everett G. Fahlman, B.S. (Cleveland, O., U. S. A.). "The Effect of Low-Temperature Heating on the Release of Internal Stress in Brass Tubes."

Andrew, Professor J. H., D.Sc., and Robert Hay, B.Sc., A.I.C. (Glasgow). "Colloidal Separations in Alloys." (Note).

Brown, John S. (Greenock). "The Influence of the Time Factor on Tensile Tests Conducted at Elevated Temperatures."

Callendar, L. H., B.Sc., A.I.C., A.R.C.S. (London). "Passification and Scale Resistance in Relation to the Corrosion of Aluminium Alloys."

Deeley, R. B., A.R.S.M., B.Sc. (London). "Zinc-Cadmium Alloys. A Note on their Sheer Strengths as Solders." (Note).

Donaldson, J. W. (Greenock). "Thermal Conductivities of Industrial Non-Ferrous Alloys."

Ellis, Professor O. W., M.Sc. (Toronto, Ont., Canada). "The Influence of Pouring Temperature and Mold Temperature on the Properties of a Lead-Base Anti-Friction Alloy."

Gayler, Marie L. V., D.Sc. (Teddington). "On the Constitution of Zinc-Copper Alloys containing 45 to 65 per cent of Copper."

Greaves, R. H., D.Sc. and J. A. Jones (Woolwich). "The Effect of Temperature on the Behavior of Metals and Alloys in the Notched-Bar Impact Test."

Hanson, D., D.Sc. and Marie L. V. Gayler, D. Sc. (Teddington). "On the Constitution of Alloys of Aluminium, Copper and Zinc."

Haughton, J. L., D.Sc. (Teddington) and W. T. Griffiths, M.Sc., F.I.C. (Woolwich). "The β Transformations in Copper-Zinc Alloys."

Hyman, Harry, Ph.D. (Glasgow). "The Properties of Some Aluminium Alloys."

Portable Tool Company, Dayton, Ohio.

perature-Tensile Curve. (*a*) Effect of Rate of Heating. (*b*) Tensile Curves of Some Brasses."

Jenkins, C. H. M., B.Sc., A.R.S.M. (Teddington). "The Physical Properties of the Copper-Cadmium Alloys Rich in Cadmium."

Phillips, George Brinton, A.B. (Philadelphia, Pa., U.S.A.). "The Primitive Copper Industry of America."

Stockdale, D., B.A. (Warrington). "The Alpha-Phase Boundary in the Copper-Tin System."

AMERICAN ELECTRO PLATERS' SOCIETY

BRIDGEPORT BRANCH

HEADQUARTERS, CARE OF R. J. O'CONNOR, 1228 NOBLE AVE.

Bridgeport Branch Outing will be held at the Interdale on the road to Walnut Beach, Milford, Conn., September 19, 1925. There will be a baseball game, athletic contests, shore dinner, dancing, etc., with 25 acres of land to enjoy yourself in. The Ladies' Committee will see that the visiting ladies will be well entertained. For additional information address the Secretary, at the above address.

DAYTON BRANCH

HEADQUARTERS, CARE OF ALBERT BATES, BOX 34, VANDALIA, OHIO.

At a dinner of the Dayton Branch, given in honor of Walter Fraine, E. Lamoureaux presented to Mr. Fraine in person the Founder's Medal awarded to him at the recent National Convention of the American Electro-Platers' Society. Mr. Lamoureaux spoke, in part, as follows:

"I wish to dwell upon our profession of Electroplating. There are among us here a number who when they entered this field they did so individually and were isolated and alone. There was practically no place or no one to turn to for information and each party worked out his problem as best he could by rule of thumb. We were in a wilderness as it were, rambling around in darkness seeking always for light and deliverance from this condition of obscurity. Finally the dawn came through the creation of the A. E. S. and all of you are familiar with the advancement and progress which has been made during the last few years through the medium of our society.

"A great deal might be said in praise of a good many men who have given freely of their time and from their fund of knowledge to help their fellow members, but none could excel from this point of view the man to whom we are paying tribute on this occasion.

"Like all great movements forward, it was not to be expected

that we would attract all men engaged in our work, and there are still many who remain outside and to whom we extend the hand of welcome. But for the time being contrast if you will any plater who remains isolated and in a good many cases under the delusion that he possesses information that he does not wish to divulge for the benefit of his fellow craftsmen, with the man we are here to honor. For the one there is nothing but obscurity and selfishness and for the other national prominence and personal pride in having achieved the highest pinnacle as a benefactor to his fellow members.

"It may be interesting for you to know that I presented the original draft of the Prize Award Plan to Mr. Fraine during his first term as Supreme President of our Society, and again during his second term. Hence, it is an extreme pleasure to have the honor to present to you, Mr. Fraine, a Past President of the A. E. S., both the highest prize or Founders Medal and the First Certificate of Award because of the fact that you exemplify the ideals of our Society.

"Your deep research into the basic reasons for the rate of efficiency of feeding copper solutions as read at the Milwaukee Convention and published in our REVIEW in August, 1924, in comparative tables with its several reasons for and costs thereof, explicitly stated were of the highest type of information to our craft and of unlimited possibilities in determining many methods of estimating costs and deposits. I can say I believe without question that your contribution of this paper and data is the best and most comprehensive information our members have received this year and for many years in the past.

"In conclusion it gives me great pleasure to congratulate the Dayton Branch on the honors brought to it by its Past President of the A. E. S. This should further incite its members to greater efforts, and also all of our members of the twenty-two branches, to compete for these honors. The intrinsic worth of prizes is very moderate but the real value can never be measured. It will be a tribute that you have left this world better for having been in it. Such honors are not to be looked upon as insignificant."

Mr. Fraine answered as follows:

"It is to me a matter of great gratification and pride to be honored with the Founders' gold medal for what the judges decided was the best paper on electroplating subjects submitted to the A. E. S., during the past year. It is a gratification to have been able to offer something that met with such approval to the society as a whole and that brought to our members valuable information regarding the differences in the value of different types of copper anodes in cyanide solutions; it is a matter of pride as an additional honor that it is the first ever presented by the Society. The presentation of this medal each year for the paper having the greatest educational value will, I am sure, be an inspiration to every member to enter the competition. I believe that the founder of the A. E. S., Mr. Chas. H. Proctor, has started something that is going to do more, to raise to a higher standard of educational value the papers submitted for discussion than he ever expected. May he live many years and each year find an increasing pleasure in presenting to the fortunate winner the Founder's award and medal."

HARTFORD BRANCH

HEADQUARTERS, CARE OF J. R. KENNEDY, BOX 256, SPRINGFIELD, MASS.

The Hartford Branch will hold a meeting in the Springfield Chamber of Commerce Building, Springfield, Mass., on Monday evening, September 28, at 8 P. M. The meeting will be devoted to papers on the finishing of metals.

NEW YORK BRANCH

HEADQUARTERS, CARE OF E. L. TANNERT, 2356 WATERBURY AVE.

The second July meeting of the New York Branch A. E. S., was held at the regular meeting room 509, World Building, New York City.

The meeting, which was well attended, was featured by Mr. Dubpernell's paper on Chromium Plating. Lengthy discussions followed said paper by members, including Mr. Hogaboom of Newark Branch. Both gentlemen were given a rising vote of thanks.

The August meetings of the New York Branch were well attended. The Branch held an outing on Sept. 12, 1925, at "Tappens," Sheepshead Bay.

ST. LOUIS BRANCH

HEADQUARTERS, CARE OF F. P. MENNIGES, 3205 ARSENAL STREET

St. Louis Branch held a special meeting on July 6th at Alhambra Grotto. E. W. Heil of Wichita, reported on the educational features of Montreal convention, stating the program was just filled with good things, and that the Monthly Review would have some good reading in it. H. H. Williams reported on the business part of the program and F. E. Terrio on the social side, all of which was very complimentary to the convention as a whole, especially to Mr. Feeley and the Montreal workers.

The new Supreme President was then given the right of way. Some plans will soon be forthcoming, that will be of much benefit to the A. E. S. Mr. Musick will have the co-operation of the whole Society in his work.

The next event of St. Louis Branch will be the Annual Outing. It will be held on August 29, 1925, at Belleville, Ill.

This is always a big family affair and is well attended.

ELECTROCHEMICAL SOCIETY

HEADQUARTERS, CARE OF DR. C. G. FINK, COLUMBIA UNIVERSITY, NEW YORK

The annual fall meeting of the American Electrochemical Society will be held this year at Chattanooga, Tenn. on September 24th, 25th and 26th. A number of important papers will be presented by well-known authorities on electrochemical subjects.

This meeting will closely follow completion of the Wilson Dam at Muscle Shoals and the Society will take the opportunity to make an inspection trip to this point as part of the program. Headquarters of the meeting will be at the Signal Mountain Hotel.

The following are some of the papers which will be read:

Notes on the Plating of Chromium on Steel. By George M. Enos.

Some Electrical Properties of Copper-Nickel-Manganese Alloys. By Norman B. Pilling.

The Protective Value of Nickel Plating. By C. T. Thomas and W. Blum.

Static Potentials of Copper in Solutions of Copper Cyanide in Sodium Cyanide and in Potassium Cyanide, and of Zinc in Solutions of Zinc Cyanide in Sodium Cyanide. By W. M. Walker, J. H. Sorrels and J. M. Breckenridge.

A Laboratory High Frequency Vacuum Furnace. By J. R. Cain and A. A. Peterson.

CHEMICAL EXPOSITION

HEADQUARTERS, GRAND CENTRAL PALACE, NEW YORK

The program of speakers for the intensive one-week course in chemical engineering fundamentals for college students, to be held in conjunction with the Tenth Exposition of Chemical Industries, September 28-October 3, 1925 at the Grand Central Palace, New York, is gradually nearing completion. Some of the leading authorities in their respective fields in the chemical industry and associated groups, will lecture at the Students' Course at the Chemical Exposition.

Three general addresses on the chemical industry, chemistry in all industry, and the buying and selling of chemicals will be given. Dr. Charles H. Herty, president of the American Synthetic Organic Chemical Manufacturers Association, will speak on "The American Chemical Industry"; Dr. Arthur D. Little on "The Application of Chemistry to Industry"; William Haynes on "Buying and Selling the Products of Chemistry."

Addresses on special phases of chemical engineering practice will be given as follows: "Handling of Materials—Intraplant Transportation" by A. E. Marshall of the Corning Glass Works; "Ceramics in the Chemical Plant" by Ross C. Purdy, secretary of the American Ceramic Society; "Heat Resisting Alloys" by Arlington Bensel of Victor Hybinette, Inc.; "Liquids and Their Centrifugal Separation" by W. D. Cleary of the De Laval Separator Company; "Dryers and Drying" by F. E. Finch of the Ruggles Coles Engineering Corporation; "Conveying with Steel Belting" by James S. Pasman of Sandvik Steel, Inc.; "Lacquers as a Protective Coating" by Arthur Orr of the Commercial Solvents Corporation; "Bakelite" by T. S. Taylor of the Bakelite Corporation.

The speakers scheduled thus far represent only a part of the finished program for the Students' Course.. The Course is open to all who desire to go over a one week's course in the fundamentals of chemical engineering. Lectures will be held each morning of the Exposition at the Grand Central Palace.

No charge is made to those who attend.

AMERICAN WELDING SOCIETY

HEADQUARTERS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASS.

Plans are practically completed by the welding industry to make the Fall Meeting of the American Welding Society the largest and most successful ever held. Three days, October 21, 22 and 23, 1925, will be devoted to the various technical sessions, demonstrations, exhibits and entertainment. The headquarters for the meeting will be at the Massachusetts Institute of Technology, Cambridge.

Five technical sessions are scheduled on important subjects. The papers will be printed and distributed in advance and the greater part of the time of each session will be given over to a discussion by those present. A complete program will be sent upon request.

NATIONAL SAFETY COUNCIL

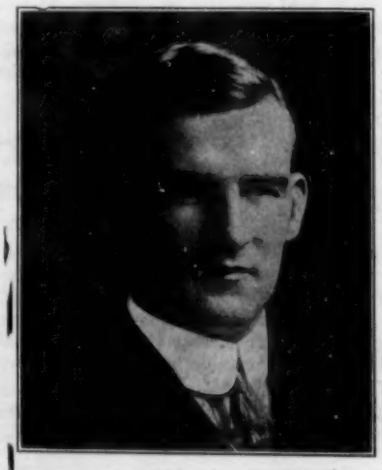
HEADQUARTERS, 168 NORTH MICHIGAN AVENUE, CHICAGO, ILL.

The Fourteenth Annual Safety Congress will be held in Cleveland, September 28-October 2, 1925. Headquarters will be at the Hotel Statler.

Personals

WILLIAM B. PRICE

William B. Price, Chief Chemist and Metallurgist of the Scovill Manufacturing Company, was born in New Haven, Conn., and was graduated in chemistry at Sheffield Scientific School, Yale University, in 1902. While in his senior year, Mr. Price discovered some Manganic Periodates. The periodates of manganese were the only ones of the common metals that had not been isolated and the eminent French chemist Rammelsberg stated that these compounds could not exist in acid solution. However, Mr. Price was able to isolate three from acid solution, which formed the basis of his thesis and the results of his experiments were published in the American Chemical Journal, Vol. 30, 1904, under the title of "On Some Manganic Periodates." These periodates are bright red precipitates and were produced by the addition of sodium or potassium iodates, or free iodic acid to a solution of manganous sulphate containing nitric or sulphuric acid. The following were obtained: $Na_2Mn_2I_2O_{11}$; $K_2MN_2I_2O_{11}$; $H_2MN_2I_2O_{11}$. They are insoluble in boiling water and in boiling nitric or sulphuric acids.



WILLIAM B. PRICE

In the Fall of 1902, he was employed by the Scovill Manufacturing Company as chemist and since 1906 has been Chief Chemist and Metallurgist.

He is a member of the following societies: American Institute of Mining and Metallurgical Engineers, Society of Automotive Engineers, American Society for Testing Materials, American Chemical Society, American Electrochemical Society, Institute of Metals (British).

Mr. Price was one of the pioneer metallurgists of the brass industry, and has done much to place the brass industry on a scientific basis. He was the first to recognize the need of standardized methods for the chemical analysis of the non-ferrous alloys, and in the year 1911 produced the first book on brass analysis. This was the well known "Technical Analysis of Brass," John Wiley & Sons, which has been widely used in the non-ferrous industry, and many of the leading colleges and technical schools of the country. He collaborated with Prof. John C. Olson, Professor of Chemical Engineering, Polytechnic Institute, Brooklyn, N. Y., in preparing a chapter on the Analysis of Alloys in Standard Methods of Chemical Analysis by Scott.

He has done much original work in standardization of the methods of chemical analyses of copper and zinc, and was chairman of the Sub-Committee on Methods of Analysis of Non-Ferrous Alloys of the Division of Industrial Chemists and Chemical Engineers of the American Chemical Society, and in 1915 formulated standard methods for the battery assay of copper and the analysis of spelter. These were adopted by the American Chemical Society in 1915 and by the American Society for Testing Materials in 1919, and were approved June 15, 1921, as Tentative American Standards by the American Engineering Standards Committee.

Original and constructive work has been carried on by Mr. Price in connection with the development of fine grained Admiralty condenser tubes and the improved methods of manufacturing the same by the cupping process; improvements in developing free cutting brass rod; the recovery of waste products in the process of manufacture of non-ferrous alloys; in the development of buffing compounds, lacquers and special cleaning compounds; the application of technical control to manufacturing operations; the formulation of standard specifications for non-ferrous alloys, oils, greases, acids, etc., and work on the nomenclature of metals and alloys.

Mr. Price is the author of numerous scientific articles published in the Proceedings of the American Society for Testing Materials, Transactions of the American Institute of Mining and Metallurgical Engineers, Journal of Industrial and Engineering Chemistry, Chemical and Metallurgical Engineering, Metal Industry, etc., on the prevention of season cracking of brass, metallurgy of copper, nickel silvers and non-ferrous alloys, physical properties of brass and nickel silver, and methods of analysis and testing of non-ferrous alloys. He was the first to bring out the valuable features of a combination of testing and ductility machines in testing non-ferrous alloys.

He is a past president of the American Institute of Metals, past chairman of Sub-Committee IX on Nomenclature, A.S.T.M., and at the present time is chairman of Sub-Committee III for the International Standardization of Zinc, chairman of Sub-Committee on Wrought Brasses and Bronzes, S.A.E., and a member of the Ordnance Department, Metallurgical Advisory Board.

He has recently patented a new non-corrosive white metal alloy, which resists the action of alkalies, hot gases, salt solutions, dilute organic and inorganic acids, and maintains its strength to a remarkable degree at high temperatures. This alloy consists of 70 per cent copper, 29 per cent nickel and 1 per cent tin and was originally developed for the manufacture of diaphragms. A description of this alloy and its physical properties was given in a paper presented at the June meeting of the A.S.T.M. in connection with the symposium on "Corrosion Resistant, Heat Resistant and Electrical Resistance Alloys" and reprinted in THE METAL INDUSTRY for January, 1925. This alloy is interesting not only as a metallurgical product, but also for the suggestions which it offers for use in various metallurgical devices, and falls into the class of alloys which show both corrosion resistance and heat resistance. One of its most promising fields, therefore, should be that of metallurgical construction. This patent has been assigned to the Scovill Manufacturing Company.

Charles E. Blizard will carry on the business of the Industrial Supply Company, Inc., 31 Broadway, New Haven, Conn., as manager.

Charles K. Schweizer, president of the Chas. K. Schweizer Company, St. Louis, Mo., was in New York August 27th on one of his regular business trips.

C. E. Boyd, formerly sales representative for the E. J.

Woodison Company, Detroit, Mich., has been made works manager of the Newman Foundry Company, Kendallville, Ind.

B. E. Miller, formerly with the C. B. Shepard Company, Detroit, Mich., for two and a half years, is now connected with AC Spark Plug Company, Flint, Mich., as foreman plater.

M. A. Weidmayer, formerly Black & Decker's branch manager at their Detroit, Mich., office, is now associated with the United States Electrical Tool Company in charge of its Philadelphia office.

C. F. Scaffe, formerly connected with the St. Louis office of Black & Decker, is now associated with The United States Electrical Tool Company as special representative operating from their general office at Cincinnati, Ohio.

George **A. Lennox** has been appointed assistant general sales manager of the Driver-Harris Company, with headquarters at the main office and plant at Harrison, N. J. Mr. Lennox has been with the company for several years, serving in practically all departments.

Horace **C. Knerr** announces his resignation as chief metallurgist, U. S. Naval Aircraft factory, to engage in professional practice as consulting metallurgical engineer, specializing in heat treatment and metallography of stell and light alloys. He is located at 1500 Green street, Philadelphia, Pa.

G. S. Warren, vice-president of A. P. Munning & Company, has resigned as of October 1, 1925, to become vice-president and general manager of the William H. Keller, Inc., Grand Haven, Mich., manufacturers of pneumatic tools. Mr. Warren has been connected with the Munning Company for the past seven years, having been located in Chicago all of that time.

W. R. Carroll, for many years expert in the construction of non-ferrous rolling mills, has been retained by the Farrel Foundry & Machine Company in the capacity of consulting engineer. Farrel Foundry & Machine Company, which is located in Ansonia, Conn., has been one of the leading manufacturers of metal rolling machinery for over 75 years.

Lawrence W. Servaty, formerly with the English & Mersick Company of New Haven, Conn., has taken a new position with the Federated Metals Corporation of New York City. Mr. Servaty had been with the former company for twenty-eight years and had been one of the stockholders and executives. At present Mr. Servaty is in charge of the ingot department of the Newark plant of the Federated Metals Corporation.

Dr. R. W. Woodward has resigned as chief metallurgist of the Whitney Manufacturing Company, Hartford, Conn., to become associated with the Stanley P. Rockwell Company, consulting metallurgical engineers of Hartford, Conn. This company is now placing on the market the Rockwell Dilatometer, an equipment of precise heat-treatment of steel, and Dr. Woodward will have charge of this department, as well as being available for general consulting practice.

Harold Bates has recently joined the sales department of the Bridgeport Brass Company, Bridgeport, Conn., and will be engaged with matters pertaining particularly to sales organization and research. Mr. Bates has had considerable experience in sales and engineering work. He has served in various capacities in the public utility business, and aided in the development of the sales program of the Winchester Repeating Arms Company during the crucial period immediately following the war.

William J. Priestly has been transferred to the home office of the Electro-Metallurgical Sales Corporation, 30 West 42nd street, New York. He was formerly located at 817 Oliver Building, Pittsburgh, Pa. Mr. Priestly is assistant general sales manager of the above company, and assistant general sales manager of the electrode division of the National Carbon Company. **R. S. Poister** has been employed to succeed Mr. Priestly as metallurgical engineer at Pittsburgh, effective October 1st. He was formerly connected with the United Alloy Steel Corporation, Canton, Ohio, and is now with the Alan Wood Iron & Steel Company, Norristown, Pa.

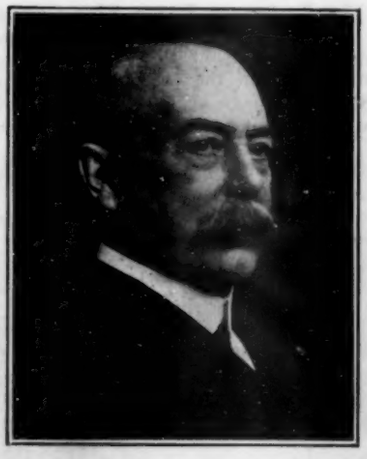
NOAH F. YOUNG

Noah F. Young has been elected president and treasurer of the Lumen Bearing Company, Buffalo, N. Y., succeding William H. Barr. He became connected with the Lumen Bearing Company, August 20, 1906, at the age of 19, as assistant cashier, and was later promoted to cashier and assistant treasurer, and has been treasurer for the last five years. Last February at the annual meeting of directors he was elected general manager and treasurer in full charge of the company's affairs. On July 20th he was elected president and will continue to act as treasurer.

Obituaries

CHARLES UPHAM ELY

Charles Upham Ely, who died in New Haven, July 5, 1925, and whose funeral took place July 8th in the chapel in Greenwood Cemetery, Brooklyn, was born in New York City, September 12, 1842, son of Charles Ely of West Springfield, Mass., and Eliza Upham of Portsmouth, N. H. He attended the Russell Military Academy in New Haven, Conn., and was military captain at the time of his graduation. After passing his examinations for Yale University he enlisted with the 46th Massachusetts Infantry, organized at West Springfield, Mass., and was second lieutenant when that regiment was called to action during the Civil War. He returned as first lieutenant. He was a member of the New York Commandery of the Military Order of the Loyal Legion at the time of his death.



CHARLES UPHAM ELY

He engaged in the manufacturing business and for many years was junior member of the firm of Yates & Ely, metallurgists and manufacturers of anodes. In 1887 succeeded to this business under the name of C. Upham Ely up to 1921 when the business was incorporated as the Ely Anode & Supply Company, of which company he was president up to the time of his death. He was also for many years president of the American Saw Company of Trenton, N. J. On October 12, 1871, he married Jessie Kent of Brooklyn, N. Y., who died several years ago.

He is survived by his widow, Ellie Haviland of Brooklyn, N. Y., and a son and daughter by his first marriage, Mrs. Augustus L. Williams of New Haven, and Morris U. Ely of Brooklyn, N. Y.

JOHN J. HAYES

John J. Hayes died at his home in Chicago on July 28th. Mr. Hayes was a member of the firm of J. J. Ryan & Company, brass founders, Chicago, and was well known in the trade in that locality.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

SEPTEMBER 1, 1925.

Industrial conditions in Waterbury have shown marked improvement during the past month, employment officials of seven of the biggest companies state. In fact during the quarter ending July 1, the rate of decrease in employment slowed down to zero; during the two months since then, the curve has become one of increasing employment.

At the **American Brass Company,** officials state that the full average of business is being conducted and that normal business conditions seem to prevail. A decided improvement over conditions of the spring is noted. The same improvement is reported by the officials of the **Chase Companies** and of the **Scovill Manufacturing Company.** Both concerns, officials state, are now employing their normal working forces and a general increase in the number employed, although slight, is growing weekly. At the Chase companies, two plants have greatly increased forces while the third is about the same.

Building operations at the **French Manufacturing Company,** which has been doing an overflow business during the winter, spring, and summer months, are continuing, and a new piece of property bordering on the west of the present land of the company, was purchased during the past month for the construction of a boiler house. The company is also building a large addition to its plant on Grandview avenue to relieve the congestion of its present plant which has been working 24 hours a day since winter. **Leon H. French,** superintendent of the factory, states that the new addition as well as relieving congestion will mean a substantial increase in the working force of the plant.

Building operations for the construction of a new factory for the **Patent Button Company** have been started. It will be 60 x 174 feet and five stories in height. It will front on Abbott avenue and will join in the rear with the present buildings of the Patent Button Company on Brown street. The cost will be close to $200,000. It will be of concrete and steel with brick trimmings.

E. W. Goss of the **Scovill Manufacturing Company,** son of **E. O. Goss,** the president, has been appointed to represent Gov. John H. Trumbull at the conference of New England governors to consider the coal situation. He was a member of the New England conference which met with the Interstate Commerce Commission last year to study the situation. He states that the conference will urge the use of bituminous or some other substitute for anthracite in an effort to bring coal within prices that the householders can afford.

Alton Farrel, treasurer of the **Farrel Foundry & Machine Company,** has been elected second vice-president of the **Connecticut Chamber of Commerce.**

John Goss, son of **John H. Goss,** the vice-president and general superintendent of the Scovill Company, a student at Yale, has been spending his summer vacation in overalls and jumper working in the brass mill, instead of vacationing at fashionable summer resorts with his associates. His studies at Yale include special subjects concerning the manufacture and treatment of metals and during the vacation he is obtaining practical training in the application of these subjects. He is also attending the school for apprentices conducted by the factory.

It is understood that his intention is to begin at the bottom and work his way through practically all the departments of brass making. In this, he is following in the footsteps of his uncle, **Chauncey P. Goss, Jr.,** now superintendent of the rolling mills, who started in as a caster's helper, became a caster, then a rolling mill apprentice and a roller, besides working in several other departments. **Harry Wayne,** another nephew of Chauncey P. Goss, is working on the night shift of the casting shop.

Action for damages brought a year ago by Thomas A. **Edison, Inc.,** against the **Waterbury Battery Company** has been settled, the local company paying $25,000 to the Edison Company. Action was brought because of the alleged violation of certain rights on improved storage batteries to which the Edison Company claimed exclusive rights.

Umberto Vagnini of 64 Scovill street, an employee of the **Farrel Foundry & Machine Company,** was asphyxiated at the plant, last month, while examining the cauldron of a cupola. He looked into the pot to see if it had been charged correctly and as he did so, the coke fire was started. He was almost immediately sknocked senseless by the fumes and he soon afterwards died.—W. R. B.

BRIDGEPORT, CONN.

SEPTEMBER 1, 1925.

After legal battles extending over many months, the **Remington Cash Register Company** of this city has won its suit against the **National Cash Register Company** of Dayton, O., for alleged infringement of patents. Judge Edwin S. Thomas of the United States District Court, in a decision made last month, grants the injunction asked against the National Cash Register Company and orders it to pay royalties on the machines which are involved in the suit.

The amount of royalties which the Remington company will receive from the National company as the result of this decision is estimated at from $1,000,000 to $5,000,000. The action was based on patents issued on Septemeber 22, 1922, to **William Gubelmann** for improvements in adding and recording machines, which patents were held by the local concern. It charged that the Dayton company had infringed on a number of its makes of cash registers, but the case was finally narrowed down to two makes of machines, known as Machine 1700 and Machine 2000.

The court held that all the plaintiff's claims were valid, that the Gubelmann patent was valid and that the defendant's machines 1700 and 2000 were infringements on these patents. He also severely criticized the United States patent system whereby it was possible for the defendant to gain access to the patent claims of Mr. Gubelmann before he had an opportunity to defend them. Application for his patents were filed in 1900, and in 1905 before the patents were granted, his applications were thrown open to the inspection of the defendant whose attorneys then began to file applications in which they put claims to cover the earlier inventions.

The **Bridgeport Piston Ring Company** cannot be operated at a profit, **Albert C. Schultz,** temporary receiver, says in an application filed in the Superior Court, last month, asking authority from the court to close the business and sell the property. In an accounting of the company's operations for the last two months a loss of several hundred dollars is shown.

The surplus machinery of the old **Columbia Phonograph Company, Inc.,** in the west end plants is reported to have been sold to **Morris Levine,** a New Haven used machinery dealer. The price is said to have been near $150,000 and is said to represent one of the biggest sales of second hand machinery ever consummated in the city. The sellers are the English group which recently purchased the business and centralized manufacturing activity in the East plant.

Production of machinery for the manufacture of artificial silk is being started in this city by the **Max Ams** Machine **Company.** A new corporation is being formed to handle the new line of product. The firm will be the only one in America capable of supplying the huge machinery essential to this type of manufacture. They are 62 feet long and make 250 pounds of artificial silk from wood pulp in 24 hours. The new corporation is capitalized at $99,000.—W. R. B.

NEW BRITAIN, CONN.

SEPTEMBER 1, 1925.

Summer is rapidly giving way to autumn but so far as general manufacturing conditions are concerned this means but little in the hardware city for business, which has been good all summer, gives every indication of continuing into the fall and winter without let-up. In fact a survey of the Connecticut manufacturing cities by the state labor department has resulted in the official statement that conditions in New Britain are better than in any other city of the state, the factories are working on busier schedules, the outlook is brighter and working conditions are more satisfactory.

The threatened building tie-up about the country, with its strikes in various centers, has not been reflected in the demand for builders' hardware and the **P. & F. Corbin Division** and the **Russell and Edwin Division** of the **American Hardware Corporation** have been turning out their products which in turn have been rapidly absorbed. There has been a particularly brisk demand for locks, window fasteners and transom rods.

The **North & Judd Manufacturing Company,** which recently purchased the **Traut & Hine Manufacturing Company,** is specializing particularly in automobile equipment, knobs, fasts and other accoutrement. As yet nothing definite has been stated as to what is to be done with the Traut & Hine plant.

Another New Britain concern which really is booming is the **Hart & Cooley** plant. This firm, which at present is building a large addition for its production department, manufactures a very fine grade of steel lockers, and business here never was better. The **Beaton & Cadwell Company,** makers of registers, faucets and other equipment for finishing houses, likewise is very busy.

As successful as has the summer been, from a manufacturing standpoint, there is every reason to believe that the fall and the winter will continue just as active.—H. R. J.

PROVIDENCE, R. I.

SEPTEMBER 1, 1925.

Industrial conditions in the metal trades throughout Rhode Island showed little change during the month of August from what have prevailed for some time past. Practically all branches of the metal industry are in operation, although some of them are only on part time. This is particularly the case with the various branches allied with the jewelry manufacture, in which a surplus of workers has existed for a long time. Extensive building programme, on the other hand, keeps the building trades well engaged.

Many of the manufacturing jewelry plants have been closed since the first of July and those that have resumed for the fall trade are doing so cautiously and on shortened employment rolls, and those employes who are thus temporarily released are unable to find employment in other industries.

The **American Art Foundry,** of Providence, has been recently awarded the contract for the casting of a bronze figure, "The Doughboy," to be the war memorial of the city of Quincy, Mass., and calls for delivery of the finished statue by November 1. The model to be used is the work of Bruce Wilder Saville and represents a soldier holding his rifle in position for a bayonet charge.

The **Atlantic Sheet Metal Works,** 143 Benefit street, Providence, are owned and conducted by Israel Katz, of 64 Carrington street, according to his statement.

George H. Fuller & Son's plant, Exchange street, Pawtucket, during the recent summer vacation period was thoroughly overhauled and the old smokestack on the river side of the building was taken down and replaced by a 70-foot steel stack. A number of necessary improvements and additions were made to the machinery.

According to an amendment to its charter filed the past month at the office of the Secretary of State, the **Eastern Bolt and Nut Company,** of East Provdence, has increased its capitalization from $175,000 to $300,000. The old capital consisted of $125,000 preferred and $50,000 common stock, but the amendment allows an issue of $125,000 additional stock which shall be Class A common bearing 7 per cent annually, as does the preferred, but the new issue dividends, however, are not to be cumulative like the preferred.

Th manufacturing jewelry concern of **George L. Paine & Company,** of North Attleboro, has been placed in the hands of a receiver for liquidation.

William F. Almy Company, gold and silver refiners, has been petitioned into bankruptcy by his creditors.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER

SEPTEMBER 1, 1925.

Contrary to general expectations better conditions are prevailing among Rochester's metal-using institutions. Improvement in business was noted early in the month, and at the close a number of industrial leaders have readily announced that the output of the past few weeks has been of such a character as to promise a genuine revival in industry with the advent of fall.

Of course **General Railway Signal Company** is on the road to high prosperity, owing to the important contracts for railroad signal equipment obtained during the past thirty days. The New York Central contract and that received from a Southern railway system means a great deal to metal workers in Rochester as well as to sellers of non-ferrous metal materials. Copper, brass, aluminum, lead, nickel, and antimony enter into the construction of signaling devices, as well as steel.

Production is said to be increasing at the **Eastman Kodak** plants about the city and at Kodak Park itself. A new form of motion-picture camera promises to add greatly to the regular output at Kodak Park. The **Bausch & Lomb** optical works are doing a larger business of late. All of the brass foundries and copper-plating establishments in Rochester report improvement during the past thirty days.

No new enterprises are planned at this time, but it is claimed that the business outlook promises steady employment and a largely increased output by the middle of September. Jobbers of metals report stocks fairly low in Rochester, because of a policy of hand-to-mouth buying that has prevailed since early in the year. With a loosening up in orders in the fall, much buying of new supplies should be given out by Rochester dealers. Purchasing agents in leading plants profess to be well stocked up at the present, but it is nevertheless a fact that regular stock orders have been held in abeyance all summer pending reasonable assurance of better business in the fall and winter.—G. B. E.

TRENTON, N. J.

SEPTEMBER 1, 1925.

While some of the metal plants are busy here others report a falling off in orders. The boom in the pottery industry aided the metal plants. All the metal parts for pottery ware are manufactured at Trenton. The **Trenton Brass and Machine Company** has been busy for some time, while the **Skillman Hardware Manufacturing Company** experiences similar conditions. The Roebling plant, however, is not operating to capacity.

Oliver O. Bowman, head of the **Jordan L. Mott Company,** recently celebrated his 87th birthday. Mr. Bowman is now very ill in the McKinley hospital as a result of a fall some time ago.

The following concerns have been incorporated here: **Crowell Chemical Company,** East Rutherford, N. J., $20,000 capital, manufacture chemicals; **Accelerite Manufacturing Company, Harrison,** N. J., $125,000 capital, control pedals; **Neo Nuforal Laboratories, Inc.,** East Orange, N. J., manufacture chemicals, $100,000 capital; **H. W. B. Laboratories, Inc.,** Montclair, N. J., 10,000 shares no par, to manufacture electric

sound reproducers; **Gold Seal Manufacturing Company, Inc.,** radio supplies, Newark, N. J.

Russell Fleming, of Plainfield, N. J., has been appointed by the federal court as temporary receiver for the **J. K. Osborn Manufacturing Company,** of East Runyon street, Newark, N. J. The company manufacturers metal goods. The action was the result of an equity suit filed with Judge Runyon by Ralph Rossano, of New York, the plaintiff creditor. The Osborn company filed a consent to the receivership. The liabilities were estimated to be $27,000, and the assets $10,000.—C. A. L.

PITTSBURGH, PA.

SEPTEMBER 1, 1925.

Trade in galvanized materials in the Pittsburgh district during July was 10 per cent higher than during the same month a year ago, according to reports from local concerns. According to sales made so far, in August, local companies say, it is possible that a record will be made. Galvanized materials used in the construction of telephone and telegraph lines are especially strong, as it is in this time of the year that most of the work in that line is done. Galvanized hardware is selling in good quantities.

Conflicting reports are heard regarding the volume of business in the jewelry trade during the first six months of 1925. The majority of them, however, show a decline when compared with the 1924 totals. The best records have been made by distributors in the Middle West and the East. The chief interest at present seems to be in novelties, diamonds, and watches of the bracelet variety.

Production has been smaller than it was last year, and manufacturers of the better grades of gold jewelry and plate have comparatively few orders on hand. Most of them are now running about three days a week. The same is true of silverware manufacturers.—H. W. R.

MIDDLE WESTERN STATES

CLEVELAND, OHIO

SEPTEMBER 1, 1925.

Only light orders have been booked by manufacturers of metal products in the Cleveland district during the past month. Plants are working about 60 per cent normal in many instances, but this affects steel and iron more than metals.

Insurance, legislature problems, employe training and other subjects were on the program for discussion when the annual convention of the **Ohio State Foundrymen's Association** opened at Cedar Point, Ohio, September 3, 1925. The convention will adjoin the following day. The list of speakers included: **Malcom Jennings,** Columbus, executive secretary of the Ohio Manufacturers' Association; **L. A. Hartley,** Chicago, director of education of the National Founders' Association, and **W. G. Wilson,** insurance expert.

A recent fire in the plant of the **J. A. Cochrane Brass Manufacturing Company,** at 1391 East 41st street, Cleveland, caused a loss estimated at $4,500.

Incorporation papers were recently granted at Columbus to the **Excelsior Metal Specialty Company,** located at 3259 West 25th street, Cleveland. The new firm was incorporated for $30,000.—S. D. I.

INDIANAPOLIS, IND.

SEPTEMBER 1, 1925.

Indiana foundrymen, in addition to being permitted to form organizations for usual association business, now may include in association activities the fixing of maximum wages for employes, according to a recent ruling of the Indiana Appellate Court. Not only that, but one foundryman having entered into the agreement dare not break it and pay more than the maximum wage, else the others have recourse at law in much the same manner as if any contract were broken.

In one case employers had banded together and said the rate of pay for a certain piece of work was to be $1 an hour. The defendant had given a bond of $1,000 that he would abide by the agreement, as had all other parties to it. It was found, however, that in order to secure labor, the defendant had paid $1.25 an hour in some cases. Suit was brought in the county courts for $1,000 damages against the defendant and his bondsman. The lower court forfeited the bond and the case was appealed.

The opinion of the higher court says: "In Indiana the law recognizes the right of laboring men to combine to promote their own interests and to enforce their combinations by any lawful means, even to the extent of picketing an employer's premises. If the employe has the right to say what wages he will work for, the employer should have the right to say what wages he will pay. If men lawfully combine to accept a minimum wage which they fix and may enforce that combination among themselves by fines, suspension or other form of discipline, employers likewise may form a combination for any lawful purpose, including the fixing of a maximum wage and enforce it by the same means available to the employes.

"If labor organizations and similar associations did not have the right to enforce compliance and submission to their rules, regulations and by-laws, they would be powerless and the courts have upheld such organizations as long as they are organized for a lawful purpose, and will aid them in carrying out and enforcing all contracts with reference to the same."

Workmen have begun excavating at Columbus, Ind., for a new factory for the **Indianapolis Bump & Tube Company.** The building will be concrete. A second unit will be started soon. When the entire plant is completed, the Dan Patch coaster wagon division of the company, now located at Connersville, Ind., will be housed at the Columbus plant. **Quinton Noblitt,** who formerly lived near Columbus, is president of the company.—E. B.

DETROIT, MICH.

SEPTEMBER 1, 1925.

The radio industry in Michigan and other parts of the United States and Canada is bringing much joy to the copper and brass industry. With the 1925 production of radio sets estimated at 2,000,000, statisticians estimate that 7,750,000 pounds of copper and brass will be used in the production of the metal parts entering into construction of the sets.

The **Wave Radio Corporation** is the name of a recently incorporated concern at Royal Oak, a suburb of Detroit. The capital stock is $25,000. It already has started manufacturing radio sets and devices. The stockholders are **Proctor Brevard** and **Charles Stellwater.**

Three hundred and fifty thousand no par common shares of the **Bohn Aluminum & Brass Corporation,** which operates three plants and the **Peninsular Smelting & Refining Company,** a subsidiary, have been listed by the Detroit Stock Exchange. The company's sales for the first quarter of the year were $3,094,461 and profits, after bond interest and federal taxes, $252,300. The president of this organization is **Charles B. Bohn.**

The **Edmund & Jones Corporation** has authorized the sale of 10,000 shares of unused common stock with rights to holders of record of August 14 to subscribe to one share at $26 for each four held. Directors, it is said, plan to place the common on an annual $3 dividend basis with quarterly dividends at 75 cents beginning October 1. The present rate is $2 annually. The half year's net income was $181,046, equal after preferred dividends, to $4.26 a share on the common stock.

The growth of the **Michigan Copper & Brass Company** is one more instance of the headway that has been made in this direction since the birth of the automobile industry. Announcement is made that this company has adopted a $350,000 expansion program which probably will be completed by January 1, 1926, and will materially increase the capacity of the rolling mills. The steam plant will be dismantled and all

equipment henceforth is to be motor driven. Expenditures also will be made to facilitate handling of materials so that the company's products may be made at minimum cost. Business of the company so far this year, according to **A. B. Seelig,** vice-president, is considerably ahead of that of one year ago, and also is ahead of 1923, which was considered the banner year in the brass industry. Next year the company will celebrate the 20th anniversary of its founding.

The **Jewett Radio & Phonograph Company** has recently begun production at its fine new plant near Pontiac, a suburb of Detroit. This is one of the largest organizations of the kind in the country and has a heavy annual production schedule.—F. J. H.

In an address before the **National Association of Brass Manufacturers** at Detroit recently, **E. W. McCullough,** manager of the department of manufacture of the United States Chamber of Commerce, declared that organizing the units of an industry into a trade association to deal with its common problems is both legal and desirable. "Moreover," he added, "recent decisions of the Supreme Court have made it clear that important information vital to the industry may be gathered and passed on by the association to its members and made available to the public without governmental interference, provided that, at all times, such information is not used in any way as a vehicle for price-fixing or curtailing production." Mr. McCullough went on to say that "the largest units in industry have their organizations and equipment for gathering information useful for intelligent management. The smaller units, unable to finance individually the gathering of similar information, if we construe the recent Supreme Court decisions correctly, may organize an association and set up within such organization machinery for rendering like service and without contravention of law. After a trial of more than half a century the trade association has proven its worth as a medium for service to the members of an industry who, although they continue their relations as competitors, yet work together co-operatively in dealing with non-competitive problems which come before them from time to time."

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

AUGUST 7, 1921.

Seven Birmingham members of Parliament on August 5th visited the British Empire Exhibition at Wembley to inspect the composite exhibit of the **Birmingham Jewelers' and Silversmiths' Association.** They were received by **P. G. Beetlestone,** chairman of the exhibit committee. An item which attracted particular attention was a series of exhibits of work done by students at the evening classes for jewelers and silversmiths at Victoria street. One of the choicest pieces in this section, a gold enamel trinket box was similar to one which attracted the attention of her Majesty the Queen, who purchased it on the occasion of a recent visit. Austen Chamberlain complimented the jewelers on their very fine display, which he considered highly creditable to the city.

Good progress has been made with the bill brought forward by **Mr. Hannon,** M.P., one of the Birmingham members of Parliament, to amend the Merchandise Marks Acts 1887-1911, in their application to certain articles dealt with in the fancy jewelry and allied trades. The bill is now before the committee and is considered safe for ultimate acceptance. Its main object is to give a precise legal meaning to such descriptions as gold front, rolled gold, gold filled, gold shell, gold cased, gilt, fire gilt, mercurial gilt and other terms.

Complaints are still general as to the depression in the jewelry trade. On the occasion of a failure of a Birmingham jeweler the reason assigned at his public examination was that jewelry was no longer fashionable. This is attributed partly to changing customs and habits, but it is agreed that much more money is now spent on motor cars and various forms of sport. At present there are fewer people employed in the industry than for many years past. The gold jewelry section is practically at a standstill except for those engaged on the highest class of diamond work who get an occasional order for South America. Makers of bangles have benefited a little from the present fashion of short sleeves which presents opportunities for the display of bangles. Metal jewelry makers who were busily employed a year ago on orders for Wembley and seaside souvenirs are only doing about 15 per cent of last year's trade. A few moderate orders for electroplate have been given by shipowners.

Brass manufacturers have given their workpeople notice that they require a reduction in wages and alteration of working conditions with particular reference to the rates paid to machine molders. A wage's board regulates wages in the brass trade and a discussion has already taken place between the employers and their workpeople. There is very probability of an amicable decision being reached. Very fair demands continue in the cabinet, electrical and plumbers' hardware departments and there is scarcely unemployment. The manufacturers have lately had to cut their prices to some extent and they claim that this must involve a readjustment of costs. Just over a year ago a small bonus was conceded by the employers, and the men contend that they are still entitled to this in view of the cost of living. They consider also that competition with the continent has been reduced owing to the general adoption by the Germans of the 48-hour week.

A decided change in connection with houses building is the adoption by builders of more simple brass fittings. Stamped good or articles comparatively cheap are preferred on account of the small amount of labor required in finishing. This feature is specially applicable to municipal houses, mass production being largely employed in this class of goods. Latterly the manufacturers have been buying virgin metals rather more freely, brass scrap which was utilized very considerably some months ago being now very scarce. The makers of shipbuilding fittings are rather busier than they were.—H.

Business Items — Verified

George W. Kyle & Company are now located at 248 Lafayette street, New York City.

Vacuum Can Company announces its new factory location at 19 to 25 South Hoyne avenue, Chicago, Ill.

The **Research Service, Inc.,** announces the removal of its office to Otis building, 810-18th street, Washington, D. C.

The **All Metal Products Company** has taken part of the building at 129 Oliver street, Newark, N. J. This firm does job stamping, spinning, brazing and soldering.

David Wolfson has opened a shop at 209 Centre street, New York City, for metal spinnings and stampings, sheet metal work, experimental work, lamp manufacturing, etc.

The **Abrasive Company** took possession of a larger office building adjoining their main plant at Bridesburg, Philadelphia. Double the space is now available for office purposes.

Howard Desch has recently started a brass foundry under the name of Desch Brass Foundry, at 28 Walton street, Lebanon, Pa., manufacturing brass, bronze and aluminum castings.

The **Crown Hard Enameling Company** has taken the upper part of the building at 32 Beverly street, Providence, R. I. This concern specializes in hard enameling on jewelry of all descriptions.

Advance Wheel Manufacturing Company has moved its factory to larger space at 616-620 West Lake street. With the installation of new machinery the capacity is approximately four times that of the old factory.

The **Grabler Company,** 10 Beech street, New York City, manufacturers of plumbers' supplies, etc., has purchased a 7-story building for warehouse at 38-44 Laight street. This firm is interested in material handling equipment.

Knapp & Bollas have purchased the plant of Charles H. Doty, for many years at 11-13 McKibben street, Brooklyn,

N. Y. This concern does job plating in silver, nickel, brass and copper, as well as barrel plating and burnishing.

The **National Metal Plating Company,** 220 Taaffe place, Brooklyn, N. Y., has opened a branch factory at 20 Lexington avenue, Brooklyn. This firm does contract plating in all metals, and has a special department for enameling and japanning.

Walworth Manufacturing Company, Boston, Mass., has purchased the plant and properties of the National Pipe & Foundry Company of Attala, Ala., and has organized the Walworth Alabama Company to conduct a local manufacturing business.

Diamond Bronze Company, 5415 Brow avenue, Cleveland, Ohio, awarded contract for the construction of a one-story, 60 x 125 ft. plant on Sideway avenue. Estimated cost $40,000. This firm operates the following departments: brass, bronze, aluminum foundry.

Acme Smelting Company, 413 Second street, Chelsea, Mass., has been granted a permit to erect a one-story, 50 x 100 ft. foundry. Scheine & Levine, 508 Pemberton building, Boston, Mass., are the architects. This firm operates a smelting and refining department.

The **Advance Wheel Manufacturing Company,** Chicago, Ill., has opened an office in charge of George L. Nankervis, who will have control of all sales and engineering work in the Detroit territory. The new offices are located in the General Motors Building, Detroit, Mich.

G. Smith, formerly of 136 West 116th street, New York, has joined R. Dobkin, under the name of **Dobkin and Smith,** 31 West 125th street, N. Y. This concern does general job plating, making a specialty of hotel and restaurant ware, and contract work in gold and silver.

General Abrasive Company, Niagara Falls, N. Y., is putting up a three-story steel frame and tile building 40 ft. x 100 ft. to cost $100,000 with equipment. It will provide additional facilities for crushing, concentrating and grading the company's electric furnace abrasives.

The **C. I. Capps Company, Inc.,** announces that it is now ready to furnish high-grade iron castings for machinery parts and architectural construction in addition to the present brass and aluminum foundry and will maintain offices at 1224 East Adams street, Jacksonville, Fla., until further notice.

H. B. Sherman Manufacturing Company, Barney street, Battle Creek, Mich., is taking bids on brass foundry and finishing shop. L. J. Sarvis, 65 E. Main street, is architect. This firm operates the following departments: brass, bronze foundry; brass machine shop, tool room, grinding room, plating, soldering, polishing.

Wolverine Tube Company, 1411 Central avenue, Detroit, Mich., manufacturer of brass and copper tubing, etc., has plans for a one-story addition, 60 x 200 ft., for which bids will be taken on general contract at once. C. C. Limbocker is president. This firm operates the following departments: tool room, brazing, soldering.

Jewelers' Casting Company, Attleboro, Mass., has moved into a new and up-to-date equipped foundry, located on Mechanic street, this city. In addition to making fine castings for jewelers and silversmiths, the company specializes in making metal patterns for other foundries and this has met with such success that larger quarters are necessary.

The **Superior Plating Company** now occupies the entire three-story building at 2321 North 7th street, Philadelphia, Pa. The firm does a general job plating business in nickel, copper and brass, as well as barrel plating. The following departments are operated: grinding, plating, polishing, lacquering. W. C. Jackson is in charge as superintendent.

Gibb Welding Machines Company (successors to Gibb Instrument Company), Bay City, Mich., manufacturers of electric welding equipment, announces the appointment of Arthur Jackson, 32 Glenholme avenue, Toronto, Canada, as sales representative for Ontario and Eastern Canada. The Gibb company's line comprises arc, spot and seam welders.

The **Kuhlman Electric Company** of Bay City, Mich., has appointed the Stevens Sales Company of 134 West Second South street, Salt Lake City, Utah, as district representatives for the State of Utah and parts of Idaho and Nevada, adjacent to Utah. The Stevens Sales Company will handle Kuhlman power, distribution and street lighting transformers.

Construction will start immediately on a two-story 50 x 200 ft. japanning department and warehouse by the **Noiseless-Remington Typewriter Company,** Middletown, Conn. The James Stewart Company, New York, has the contract. This firm operates the following departments: tool room, grinding room, plating, japanning, stamping, polishing, lacquering.

National Metal Etching Corporation, room 1709, 42 Broadway, New York City, has taken title to property at Long Island City, as a site for a two and a half story factory, for which plans will soon be drawn. The company was organized recently with a capital of $126,000. This firm operates the following departments: tool room, plating, stamping, polishing, lacquering.

The **Air Reduction Sales Company,** with executive offices at 342 Madison avenue, New York City, has purchased the assets and assumed the liabilities of the **Gas Tank Recharging Company,** incorporated in 1913. The Gas Tank Recharging Company owned and operated acetylene plants at Milwaukee, Wisconsin, and Bettendorf, Iowa; and a carbide plant at Keokuk, Iowa, where they manufactured Sun-Lite brand carbide.

Chief Little Bear will head the Wyandotte delegation at the American Society for Steel Treaters Convention at Cleveland, September 14-18. The **J. B. Ford Company** will exhibit its well known Wyandotte Metal Cleaners at booth No. 55. The following Wyandotte representatives will gladly confer with you regarding cleaning: C. R. Beaubien of the Detroit office, L. C. Warden and F. R. Merrick of the Cleveland office, and B. N. Goodell and T. S. Blair of the Wyandotte office.

Haynes Stellite Company, manufacturers of Stellite metal cutting tools and other articles of these high speed, rust and corrosion resisting alloys, has just completed concentration of the company's activities at its plant at Kokomo, Ind. All service in connection with the company's products will hereafter be extended direct from the plant. Headquarters for administration, sales and engineering activities will be at Kokomo, these beng conducted under the direction of C. G. Chisholm, general manager.

The **American Cable Company,** New York, has appointed the well known firm of Bruntons, Musselburgh, to handle its general line, including Tru-lay wire rope and Tru-loc fittings, in Scotland. The Dominion Wire Rope Company, Montreal, is a new Canadian distributor. Other new distributors are: The Marion Machine, Foundry & Supply Company, Marion, Ind.; J. Shuman Hower, 106 Foster Building, Utica, N. Y.; The Contractors Equipment Company, 8 Steuben street, Albany, N. Y., and John C. Louis, 221 S. Eutaw street, Baltimore, Md.

The **Southern Brass Manufacturing Company,** 6614-6620 Harrisburg Boulevard, Houston, Texas, has erected a factory, a modern concrete structure, 75 x 140 feet, which will take care of its needs for some time. This company owns an equal amount of property adjoining the new factory building which is available for expansion. F. E. Zumwalt is architect, Robert Cummins, consulting engineer and J. L. Goodman, contractor for this building. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, galvanizing, brazing, plating, soldering, polishing, lacquering.

COPPER IN RADIO

The retail value of radio receiving sets and parts to be sold in 1925 is estimated at $500,000,000, compared with a value of $50,000,000 for sets sold in 1922, according to a survey of the radio industry just completed by the Copper and Brass Research Association.

The present rate of manufacture, according to the survey, indicates that 1925 production will be 2,000,000 sets, in which the consumption of copper and brass will be about 7,500,000 pounds. These metals are used for aerials, ground connections, coils, condensers, tube sockets, panels and miscellaneous parts.

SECONDARY METALS IN 1924

The recovery of metal from secondary sources in 1924 is reported to the Bureau of Mines, Department of Commerce, as having a value of $198,888,600, which is $6,530,000 less than in 1923. The decline, according to J. P. Dunlop who compiled the figures, is due to the smaller quantity of brass scrap remelted and the lower average price of copper in 1924.

As was anticipated, the peak of production of remelted brass scrap was reached in 1923 and the pronounced decrease in 1924 indicates that the accumulation of brass during the war period has been absorbed. The quantity of scrap copper treated at regular refineries treating ore showed an increase of nearly 12,000 tons, but the secondary smelters recovered about 11,000 tons less copper than in 1923. There was an increase of about 16,000 tons in the lead content of alloys (including antimonial lead) though the quantity of pig lead from scrap decreased about 6,000 tons. Zinc recovered by redistillation, sweating and remelting decreased 6,300 tons, mainly due to a smaller output of redistilled zinc at regular smelters. There was a small increase in zinc in alloys other than brass. As large quantities of zinc drosses, skimmings, ashes, etc., are used to make zinc dust, zinc sulphate, lithopone, and zinc chloride, it is probable that use for such products together with the quantities exported accounts for the smaller quantity of zinc recovered by redistillation and remelting in 1924. The secondary recovery of tin as metal was less in 1924 than in 1923, but tin recovered in alloys and chemical compounds increased about 6 per cent. The quantity of clean tin plate scrap treated in 1924 was slightly larger than in 1923, but for the first time in many years no tin was recovered from old tin coated containers, as the high cost of collecting and shipping old cans precluded their use. The secondary recoveries of aluminum, antimony, and nickel all increased in quantity and in value in 1924.

Secondary metals of certain classes recovered in the United States in 1923 and 1924:

	1923 Short tons	1923 Value
Copper, including that in alloys other than brass	193,200	$56,800,800
Brass scrap remelted	311,000	72,843,800
Lead as metal	96,430	27,228,600
Lead as alloys	98,060	
Zinc as metal	65,210	10,042,200
Zinc in alloys other than in brass and in chemical compounds	8,630	
Tin as metal	7,892	25,316,000
Tin in alloys and chemical compounds	22,318	
Antimony as metal	245	1,252,800
Antimony in alloys	7,776	
Aluminum as metal	6,800	10,824,600
Aluminum in alloys	14,500	
Nickel as metal	177	1,109,800
Nickel in nonferrous alloys and salts	1,373	
		$205,418,600

	1924 Short tons	1924 Value
Copper, including that in alloys other than brass	196,500	$51,483,000
Brass scrap remelted	274,000	58,444,200
Lead as metal	90,400	32,720,000
Lead as alloys	114,100	
Zinc as metal	58,886	9,020,200
Zinc in alloys other than in brass and in chemical compounds	10,500	
Tin as metal	7,700	2,025,600
Tin in alloys and chemical compounds	23,600	
Antimony as metal	90	14,596,200
Antimony in alloys	9,314	
Aluminum as metal	10,350	1,227,500
Aluminum in alloys	16,650	
Nickel as metal	114	29,371,900
Nickel in nonferrous alloys and salts	2,126	
		$198,888,600

COPPER IN 1923 AND 1924

Final statistics of the production of copper in the United States in 1923 and 1924 are issued by the Department of the Interior in a statement which has been compiled by H. M. Meyer, of the Geological Survey, as follows:

Summary of features of the copper industry in the United States in 1923 and 1924:

	1923	1924
Production of copper, pounds:		
Smelter output	1,434,999,962	1,634,249,192
Mine production	1,477,739,709	(a)
Refinery production of new copper, pounds:		
Electrolytic	1,302,454,492	1,499,223,447
Lake	137,691,306	145,333,227
Casting	24,019,197	29,657,925
Total domestic	1,464,164,995	1,674,214,599
Total domestic and foreign	1,979,835,616	2,260,076,010
Total new and old copper	2,802,000,000	(a)
Ore produced:		
Copper ore, short tons	45,519,317	(a)
Average yield of copper, per cent	1.58	(a)
Copper-lead and copper-zinc ores, short tons	162,181	(a)
Average price per pound, cents	14.7	13.1
Imports (unmanufactured), pounds	676,473,338	768,813,731
Exports of metallic copper *b*, pounds	828,854,827	1,116,775,136
Withdrawn from total supply on domestic account, pounds:		
Total new copper	1,300,473,331	1,354,742,564
Total new and old copper	2,122,000,000	(a)
Stocks of refined copper *c*	264,000,000	243,000,000
Stocks of blister and materials in solution *c*	432,000,000	393,000,000
Value of production in the United States	$210,945,000	$214,087,000
World's production, pounds	2,711,533,000	2,998,286,000

a—Figures not yet available. *b*—Total exports of copper, exclusive of ore, concentrates, composition metal, and unrefined material. *c*—At the end of the year.

COPPER CONSUMPTION

Consumption of copper metal in the United States for the full year 1925, is expected to exceed the total consumption for 1924, when a gross of 765,500 tons, due to the increased activities in automobile, building and other important industries.

Its Place in the Industry

The following table, as compiled by the American Bureau of Metal Statistics shows what proportion of the domestic copper sales is taken up by the various industries:

Industry	Consumption Short tons	Per cent total consumption
Electrical manufacture	195,500	25.5
Automobiles	93,700	12.2
Light and Power Lines	90,000	11.8
Telephone and Telegraph	80,000	10.5
Wire, rods, etc.	60,000	7.8
Manufactures for export	54,100	7.1
Buildings	40,450	5.3
Bearings and bushings	34,550	4.5
Valves and pipe fittings	21,000	2.7
All other	96,200	12.6
Total	765,500	100.0

The statistical position of the copper industry at the turn of the half year was favorable from the standpoint of surplus stocks on hand, according to the latest figures. Surplus stocks of copper on June 30, 1925, aggregated 91,326 tons, against 136,434 tons carried on Jan. 1, 1925, and 112,195 tons carried on June 30, 1924. Compared with last year the surplus stocks of metal are smaller by 18.6 per cent. The above figures on surplus stocks include the figures of the Chilean mines, which are owned by American copper companies.

COPPER STATISTICS OPEN

Copper producers have decided to resume monthly statements of the statistical position of refined metal. One large producer who heretofore was opposed to issuing monthly figures, has consented to be governed by the will of the majority of producers. July deliveries of refined copper into domestic and foreign consumption and output of the refineries will be available for publication and August figures probably will be available toward the end of the first week in September.

CANADIAN ALUMINUM PROGRESS

Construction is in full progress for the Aluminum Company of America at the huge plant in Quebec, Canada. With the actual development work completed contractors are now on the ground with large forces of men and it is hoped to have the plant in operation in twelve months. Negotiations have been opened by a Canadian shipbuliding firm with a view to the construction of the whole or part of a fleet of fifteen ships to be specially built to transport bauxite, the British Guiana material, to the Canadian refining plant. The Canadian General Electric Company has received one of the largest contracts for electrical equipment ever placed in Canada from the Aluminum Company. The equipment will all be manufactured at the Toronto and Peterboro plants and the contract will take months to complete.—P. W. B.

CANADIAN LEAD OUTPUT

Canadian mines had the greatest output of lead in their history last year, when they produced 175,485,499 pounds, worth $14,221,345 as compared with a previous high record in the preceding year of 111,234,486 pounds, valued at $7,985,522, or an increase of 57.7 per cent in quantity and 78.2 per cent in value, according to the Dominion Bureau of Statistics. The increase was caused by high prices, which caused many British Columbia mines to augment their output and induced others which had been dormant on account of the cost of separating the lead from the zinc to reopen and operate at a profit.

VULCANIZING EXPLOSION

An unfortunate accident occurred in the vulcanizing department of the Belke Manufacturing Company, Chicago, Ill., Friday, August 21, 1925. After steam pressure had been allowed to enter the vulcanizing tank, which is used in vulcanizing hard rubber to plating rack frames, an employee, ignoring all precautions of safety, attempted to re-adjust the door of the vulcanizer, and in so doing, unseated the flange lock on the inside of the vulcanizing door, which automatically eliminated all resistance of the door against the high pressure of steam in the vulcanizing tank proper, causing the door, which weighs in the neighborhood of two tons, to be blown about 30 feet, through the rear end of the building which housed the vulcanizer, and forced the vulcanizing tank about 25 feet through the front wall of the building. The door, in its passage, carried the engineer in charge of this department, C. W. Leef, with it, and forced him through a closed door, causing him to be scalded and so severely injured that he died the following day.

Beside the unfortunate death of Mr. Leef, the explosion caused damage to property, to the extent of approximately $10,000, necessitating the ceasing of operations in that department for several days. The plant is now functioning normally.

TRANSPARENT METAL

Dr. Karl Mueller of the Physical Research Bureau, Berlin, Germany, says he has discovered a process whereby it is possible to reduce metal foils to the thinness of one-millionth part of a centimeter without losing their elasticity. The process, as explained by Dr. Mueller, can be applied to all kinds of metals, including gold, rendering them transparent.

Dr. Mueller's discovery would be a great benefit to the telephone, radio and musical instrument industries. The foils produced by the new process are reported to be as transparent as the glass used by oculists, easily permitting a study of the atomic structure of precious metals.—New York Times.

GOLD MANUFACTURE IMPROVED

The amount of gold produced from the same quantity of mercury by Dr. Adolf Miethe and Dr. H. Stammreich of the Charlottenburg (Germany) University of Engineering has been increased 10,000-fold since the first announcement of the success of their experiments in April, 1924, according to advices received by the American Chemical Society from its Cothen correspondent.

When the first successful experiments were announced it was said that the cost of producing a kilogram of gold was about $5,000,000. That amount of production multiplied by 10,000 would still leave the cost of gold production prohibitive.

SHIPS BRASS STAR RETURNED

A brass star from the pedestal of the steering wheel of "Old Ironsides," now in Boston, Mass., came back August 19, 1925, to be placed in its original position from where it was taken forty years ago by a young midshipman who, "solely because of the Devil who in my early years did often take up his residence with me, did unscrew and pry from her wheel abaft the quarterdeck a brass star."

IDENTIFIED BY BRASS CHECK

A brass check issued by the Clyde Steamship Company in New York City was counted upon by officials to solve the identity of a man about 30 years old who was picked up August 15, 1925, on the Long Island Railroad tracks just outside the town limits.

INCORPORATIONS

The **Walters Automatic Gas Cut-Off Company,** 316-318 Fredericksburg road, San Antonio, Texas, organized with $20,000 capital, will manufacture gas equipment and appliances, specializing in automatic gas cut-offs. Materials used include aluminum sheets, rod and tubular brass, seamless steel tubing, steel rods, tool steel, screws, nuts, etc. W. B. Walters is president. This firm will operate the following departments: brass, bronze and aluminum foundry; brass machine shop, casting shop, japanning, stamping, tinning, soldering, polishing, lacquering; also, would like information on small plating equipment.

J. F. & W. H. Harney have organized the **Tremont Plating Works** at 446 Tremont street, Boston, Mass. This firm will specialize in general job plating in gold, silver, nickel, copper and brass, and has modern equipment for automobile work.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America...	$100	$890	$920
American Hardware Corporation...	100	91	93
Anaconda Copper	50	41¾	42
Bristol Brass	25	7	10
International Nickel, com.....	25	34⅜	34½
International Nickel, pfd.....	100	99	100
International Silver, com.....	100	180	200
International Silver, pfd.....	100	106	110
National Enameling & Stamping...	100	38	38¼
National Lead Company, com.....	100	155	159
National Lead Company, pfd.....	100	114	117
New Jersey Zinc.....	100	195	195
Rome Brass & Copper.....	100	130	143
Scovil Manufacturing Company....	..	225	235
Yale & Towne Mfg. Company, new	..	64	69

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

HARDENED LEAD

Hardening of lead has been accomplished, according to an announcement from the Hawthorne plant of the Western Electric Company. R. S. Dean and W. E. Hudson are the metallurgical engineers who are said to have accomplished this.

The new lead is made with the use of a small percentage of special alloy, and the treatment of the metal by a special process, makes a metal three times as hard as lead alloyed with the ordinary heat treatment, it is said.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

The business in the wrought metal line covering such materials as brass and copper rods, sheets, tubes and wire, together with nickel and the nickel copper alloys such as Monel metal and nickel silver reached a point in August which was extremely satisfactory to practically all of the producers.

With the stiffening of ingot copper prices together with a corresponding strength in other raw materials, a good demand arose and large tonnages were booked. Orders are fairly plentiful from all lines of industry consuming brass and copper materials, and business generally seems to be going forward at a rate which insures the continuance of good conditions in these lines for some time to come. As a result of this plentiful supply or orders the price-cutting which has been indulged in for sometime past seems to have abated to a considerable extent, and quotations for most of the fabricated items reflect an effort on the part of practically all of the producers to secure a reasonable profit on their goods.

The heavy consumption of sheet copper for roofing material continues to be one of the outstanding features of the entire metal business. This consumption is continually expanding, and it is interesting to note that such items as copper leader and gutter, at least in the Atlantic Seaboard States, are in such demand that the positions of copper and galvanized iron are now completely reversed when compared with the position that existed several years ago. Tinsmiths and roofers in this part of the country are now using copper as freely as galvanized iron was formerly used, whereas copper was only a few years ago considered a luxury and put on only the finest houses. The advertising campaigns which have been carried on for the education of the public in the use of brass and copper materials can be credited with this situation.

The same situation exists in connection with the production of nickel and copper alloys such as Monel metal and nickel silver, as well as pure nickel. The development of the manufacture of seamless nickel tubes to the point where they can now be furnished on an economical commercial basis has resulted in stirring up a considerable demand for these items.

Various branches of the chemical industry have been quick to respond to the fact that seamless nickel tubes can now be secured readily, and many of the larger concerns have placed orders for these tubes which to them fill a long felt want. Fairly large orders for Monel metal have been placed by various steel mills throughout the country for use in their pickling tanks.

As the month of August closes the producers of pure nickel and Monel metal report that they have orders on their books for a larger tonnage of these products than ever before.

Taking the entire metal industry as a whole it can be said that it is in a much more satisfactory condition than it has been for several years, and that the future looks very bright.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

Buyers continued to follow the upward trend of the market early in August. The buying was specially large for domestic account. The excellent statistical position of copper proved a very constructive factor. Active demand was stimulated as the market developed strength, and prices rose to 14⅞ cents, with some business reported at those figures. As high as 15 cents was quoted in some quarters, but at that level the market turned quiet. Foreign selling on a downward scale unsettled the situation locally and abroad. New demand became quiet at the end of the month. Concessions were obtainable on limited offerings due to European selling pressure. The domestic price reacted to 14⅝@14¾ cents, with rumors of even a lower level for resale lots. The statistical situation is particularly favorable as to available stocks of refined copper on hand. Surplus holdings of refined metal on August 1 were only 88,008 tons. As we close this report market is easy at 14½ cents delivered Connecticut.

TIN

At the close of August tin prices were substantially lower than 30 days ago. Speculative manipulation by London operators has caused frequent fluctuations in prices and a decidedly unsettled condition in both the English and American markets. It has been apparent for some time that developments in tin are quite puzzling even to seasoned traders.

There has been a decline of about 2 cents a pound in this market since August 7th. The recent high level was 59¼ cents for Straits reached in first half of month. Closing figures were 57¼ cents. Market at times was nervous and unsettled. Supplies of spot Straits have been small. The statistical position should be reflected in market strength, but the recent erratic activities of prominent London operators keeps the trade guessing as to price movements. The American deliveries for the first seven months of 1925 were 45,675 tons, being an increase of 6,305 tons over deliveries during corresponding months of 1924. Present market is quiet at 56⅛ @56⅞ cents for September Straits.

ZINC

Sales of slab zinc were in good volume recently, and the market slightly firmer than in July. The market touched the 8 cent quotation a short time ago, but the situation could not maintain this level. Concessions placed the market on an easier basis at 7.92½c@7.95c New York and at 7.57½c@7.60c East St. Louis. The position appears to be fairly sound, although any material falling off in demand would be reflected in market tone. Production of slab zinc by American producers in July amounted to 47,583 tons, against 45,921 tons in June. Stocks at smelters on July 31 were 20,771 tons, as compared with 52,705 tons on July 31, 1924. An easier tone developed at close of month.

LEAD

Remarkable firmness is the rule in lead. Values have been advanced at frequent intervals, and producers are anticipating a well sustained demand during the remaining months of the year. The American Smelting & Refining Company made eight price advances in August. Present price quoted by the leading producer is 9½ cents New York, and this level contrasts with 8½ cents early in August. Outside holders and speculators, however, succeeded in lifting prices to 10 cents and above, but buyers hesitated paying the latest advance demanded for second-hand lots. Consumpton of lead is high.

ANTIMONY

During the first half of August the market was firm and as high as 18⅛ cents was paid for spot antimony. Supplies here have been light, but recent demand has been for future shipment from China on basis of around 15 cents for August-September shipment from China. Earlier deliveries are quoted at 16.60c@16.75c for September. Spot parcels are held at 16⅞c@17c, duty paid, for 99 per cent Chinese Regulars. The market is abnormally high owing to unsettled conditions in China. Consumers hesitate to buy freely at current prices.

ALUMINUM

Demand for aluminum continues active. New business is being placed for substantial quantities, and producers have no trouble in maintaining prices at 28 cents for 99 per cent plus and at 27 cents for 98-99 per cent metal. Some orders were booked for last quarter of 1925. Activity in the automobile industry, also among utensil manufacturers, is responsible for current brisk demand. The aluminum industry is enjoying increasing prosperity.

QUICKSILVER

There is an easier market for quicksilver, and price is quoted $82 per flask. Consumers are using fair supplies, but actual business is not in sufficient volume to warrant higher figures.

PLATINUM

A fair demand for refined platinum keeps the price steady at $118 an ounce. Attractive orders might be taken at concessions, but small buyers pay outside figures.

SILVER

A stronger tone has characterized this market and the New York price has advanced to 71¼ cents per ounce. Prominent producers are putting forth efforts to increase the use of silver for coinage purposes and in other practical ways. The July production of silver by North America and Peru amounted to 16,628,312 ounces, being highest for year and compared with 15,775,192 ounces in June and 14,722,795 ounces in May. Total production for first seven months was 109,159,306 ounces. Late reports state that the U. S. Treasury is buying silver.

OLD METALS

Recent business in scrap metals was fairly active. Copper and brass have been moving at a good rate. This was specially noted when the primary market for copper continued its upward trend. The reaction in virgin metal, however, caused an easier tone for heavy copper and wire and a falling off in transactions. Lead scrap and the aluminum grades were very firm at full prices. Dealers bought at stiff prices for small parcels. Quotations on New York basis were 9¼c@9¾c for light copper, 11¾c@12c for heavy copper and wire, 7c@7¼c for heavy brass, 6c@6¼c for light brass, 8¼c@8½c for heavy lead, 4¼c@4½c for old zinc, and 22c for aluminum.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13.419—January, 1925, 15.125—February, 15.00—March, 14.375—April, 13.625—May, 13.625—June, 13.75—July, 14.25—August, 14.875.

Brass Mill Zinc—Average for 1924, 7.10—January, 1925, 8.60—February, 8.00—March, 8.10—April, 7.60—May, 7.55—June, 7.55—July, 7.80—August, 8.10.

Daily Metal Prices for the Month of August, 1925

Record of Daily, Highest, Lowest and Average

	3	4	5	6	7	10	11	12	13	14	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.625	14.75	14.75	14.75	14.75	14.875	14.875	14.875	14.875	14.875	14.875	14.875
Electrolytic	14.30	14.45	14.55	14.55	14.55	14.60	14.60	14.50	14.50	14.55	14.60	14.60
Casting	13.80	14.00	14.10	14.10	10.10	14.10	14.10	14.00	14.00	14.00	14.10	14.10
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb												
Prime Western	7.45	7.55	7.55	7.525	7.60	7.575	7.575	7.55	7.50	7.575	7.65	7.625
Brass Special	7.55	7.65	7.70	7.70	7.70	7.70	7.70	7.65	7.65	7.675	7.75	7.75
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	59.125	59.25	59.375	59.375	59.25	59.00	58.75	58.125	58.00	58.25	57.80	57.625
Pig 99%	57.875	57.75	57.875	57.875	57.75	57.50	57.25	56.75	56.375	56.625	56.25	56.125
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb	8.95	9.10	9.40	9.60	9.70	9.70	9.75	9.85	9.85	10.10	10.10	10.10
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.												
Ingot	34	34	34	34	34	34	34	34	34	34	34	34
Shot	35	35	35	35	35	35	35	35	35	35	35	35
Electrolytic	38	38	38	38	38	38	38	38	38	38	38	38
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	17.75	17.75	18.00	18.25	18.25	18.25	18.25	18.125	18.00	17.75	17.75	17.625
Silver c/oz. Troy Duty Free	69.625	69.625	69.625	69.50	69.625	69.75	69.875	69.875	69.875	69.875	70.75	70.75
Platinum $/oz. Troy Duty Free	120	120	120	120	120	120	120	120	120	120	120	120

	19	20	21	24	25	26	27	28	31	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.875	15.00	15.00	15.00	15.00	14.875	14.875	14.875	14.875	15.00	14.625	14.863
Electrolytic	14.65	14.70	14.75	14.75	14.70	14.60	14.55	14.55	14.50	14.75	14.30	14.576
Casting	14.10	14.20	14.375	14.35	14.30	14.20	14.125	14.125	14.10	14.375	13.80	14.113
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb												
Prime Western	7.60	7.65	7.65	7.675	7.65	7.65	7.625	7.60	7.625	7.675	7.45	7.595
Brass Special	7.725	7.75	7.75	7.775	7.75	7.75	7.725	7.70	7.70	7.775	7.55	7.705
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	57.75	57.75	58.00	57.875	57.75	57.50	57.25	57.25	56.75	59.375	56.75	58.181
Pig 99%	56.25	56.125	56.25	56.25	56.125	56.00	55.75	55.75	55.125	57.875	55.125	56.649
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb	10.00	10.10	10.10	10.10	10.10	10.10	10.10	9.95	9.75	10.10	8.95	9.833
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.												
Ingot	34	34	34	34	34	34	34	34	34	34	34	34
Shot	35	35	35	35	35	35	35	35	35	35	35	35
Electrolytic	38	38	38	38	38	38	38	38	38	38	38	38
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	17.50	17.50	17.50	17.25	17.125	17.00	17.00	17.00	17.00	18.25	17.00	17.649
Silver c/oz. Troy Duty Free	70.125	70.375	70.50	70.50	70.625	70.875	71.25	70.875	71.75	71.75	69.50	70.268
Platinum $/oz. Troy Duty Free	120	120	120	120	120	118	118	118	118	120	118	119.619

Metal Prices, September 8, 1925

Copper: Lake, 14.875. Electrolytic, 14.55. Casting, 14.15.
Zinc: Prime Western, 7.75. Brass Special, 7.85.
Tin: Straits, 57.75. Pig, 99%, 56.00.
Lead: 9.25. **Aluminum,** 28.00. **Antimony,** 17.125.
Nickel: Ingot, 34.00. Shot, 35.00. Electrolytic, International Nickel Company, 38.00.
Quicksilver, flask, 75 lbs., $82.00. **Silver,** oz., Troy, $72.00.
Platinum, oz., Troy, $118.00. **Gold,** oz., Troy, $20.67.

Metal Prices, September 8, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10¾to11½
Brass Ingots, Red	11½to12¼
Bronze Ingots	12 to13
Bismuth	$2.65to$2.70
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.60
Manganese Bronze Castings	23 to41
Manganese Bronze Ingots	13 to17
Manganese Bronze Forging	34 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	19½to22½
Phosphor Copper, guaranteed 10%	18½to21½
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	65 to75
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¼to12½	Heavy Cut Copper	13¼to13¾
12 to12¼	Copper Wire	13 to13½
10¼to10½	Light Copper	11½to12
9¼to 9½	Heavy Machine Comp	10¾to11¼
7¾to 8	Heavy Brass	8¾to 9¼
6¾to 7	Light Brass	8 to 8¼
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Aug. 7, 1925

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22⅞
Wire	.19⅝	.21⅜	.23¼
Rod	.16⅞	.21⅝	.23⅛
Brazed tubing	.27⅛	.....	.32⅝
Open seam tubing	.27⅛	.....	.32⅝
Angles and channels	.30⅛	.....	.35⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.20⅛	$0.21⅞	$0.23⅞
Wire	.20⅝	.22⅜	.24⅛
Rod	.17⅞	.22⅝	.24⅝
Brazed tubng	.28⅛	.....	.33⅝
Open seam tubing	.28⅛	.....	.33⅝
Angles and channels	.31⅛	.....	.36⅜

SEAMLESS TUBING

Brass, 23¾c. to 24¾c.
Copper, 24¾c. to 25¾c.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21⅛c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19⅛c. net base
Muntz or Yellow Rectangular sheet other Sheathing	20⅛c. net base
Muntz or Yellow Metal Rod	17⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	21¼c. to 22¾c. net base
From stock	22¾c. to 23¾c. net base

BARE COPPER WIRE—CARLOAD LOTS

17c to 17¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	21¼c. net base
100 lbs. to 200 lbs. in one order	22¾c. net base

ZINC SHEET

Duty, sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	11.00 basis
Casks, jobbers' price	12.25 net base
Open Casks, jobbers' price	12.75 to 13.00 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	26¾c.
15%	"	28¼c.
18%	"	29¼c.

Nickel Silver Wire and Rod

10%	"	29¾c.
15%	"	33¼c.
18%	"	36¼c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs. 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 74¼ to 76¼c. per Troy ounce, depending upon quantity.

Rolled sterling silver 71¼c. to 73¼c.

NICKEL ANODES

90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, September 8, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.25¼–.28¾
Denatured in bbls	gal.	.60–.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.08
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.33
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate dry, bbls	lb.	.29
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.093
Potassium Bichromate, casks (broken)	lb.	.08¾
Carbonate, 82-92%, casks	lb.	.06¼
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounce lots	oz.	.49¼
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.20
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¼
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.40
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, 600 lb. lots	lb.	.08
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03½

COTTON BUFFS

Open buffs, per 100 sections (nominal),		
12 inch, 20 ply, 64/68, unbleached sheeting	base,	$32.40-$40.85
14 inch, 20 ply, 80/96, " "	base,	45.25- 50.80
12 inch, 20 ply, 80/96, " "	base,	47.35- 46.20
14 inch, 20 ply, 84/92, " "	base,	63.15- 62.25
12 inch, 20 ply, 88/96, " "	base.	63.25
14 inch, 20 ply, 88/96, " "	base,	85.15
12 inch, 20 ply, 80/96, " "	base,	52.70
14 inch, 20 ply, 80/96, " "	base,	70.80
Sewed Buffs, per lb., bleached or unbleached	base,	.55 to .75